

PN-ABD-135

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GRASSHOPPER/LOCUST WORKSHOP
REPORT AND REFERENCES
HARPERS FERRY, WEST VIRGINIA
JANUARY, 1988

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GRASSHOPPER/LOCUST CHRONOLOGY

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GRASSHOPPER/LOCUST CONTROL CAMPAIGNS OF 1986 AND 1987
LESSONS LEARNED

U.S. Agency for International Development

Grasshopper/Locust Workshop
Harpers Ferry, West Virginia

Workshop Report

Harpers Ferry, West Virginia

January 18-21, 1988



Workshop Staff

Workshop Leader

Bob Thibeault

Steering Committee

Gudrun Huden

Bessie Boyd

Carl Castleron

Planning Coordinator

Bob Mutch

Logistics Coordinator

Jake Greene

Technical Compiler

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Facilitators

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Finance

Carole Siegel

Support

OICD Worldwide Programs

Bruce Crossan

*A special thanks to the staff of
the Hilltop House Hotel*

The Office of U.S. Foreign Disaster Assistance sponsored a workshop on the 1986-1987 African grasshopper/locust control program. This report summarizes the results of the workshop. The final product of the workshop will be an Operations Guidebook which will be available in June.

The workshop was planned, organized and managed using the principles of meeting management as defined by Doyle and Strauss in their book "How to Make Meetings Work" and taught in the course "Mastering Meetings for Results".

Purpose

The purpose of this workshop was to review the 1986-1987 campaign and provide direction for future campaigns.

Desired Outcomes

1. Definition of the roles of OFDA and the Regional Bureaus in future control programs.
2. A statement of the optimum desired future state for African grasshopper/locust campaigns, strategies for implementation, and understanding of the barriers.
3. An operations guidebook for future African grasshopper/locust management.

Workshop Products

1. A report of the workshop discussions and recommendations.
2. An operations guidebook for African grasshopper/locust management.
3. A compilation of the responses to the workshop questionnaire.

BACKGROUND

In 1986 and 1987, the USG provided \$20 million to control the largest post-drought upsurge of grasshoppers and locusts in Africa in 60 years. Through the efforts of the donor community in providing 100 million dollars, hundreds of thousands of hectares of crops were protected, and the specter of another serious food deficit in Africa lessened. The USG mobilized experts in entomology, aerial and ground control operations, logistics, and environmental monitoring to implement programs in over 11 countries. The evaluation workshop was an opportunity for Mission project managers, AID/W personnel, and the technical experts to share and document the extensive knowledge and experience in all aspects of grasshopper/locust control gained over the past two years. In addition, the gathering was an occasion for reviewing state-of-the-art technologies and research in grasshopper/locust control, as well as for discussing the important environmental issues related to the use of pesticides in developing countries.

Knowing that grasshopper/locust outbreaks will continue to plague Africa for years to come, the goal of the workshop was to produce a guidebook which would combine the recommendations of the technical experts, the project managers, and the policy makers into one readable manual for the non-expert who might find him/herself assigned to organize and manage a grasshopper/locust program (emergency or non-emergency) in the future.

WORKSHOP AGENDA

Monday Evening Welcome and social hour

Tuesday

AM Startup

Orientation/announcements—Bob Thibeault, AID, OFDA

Julia Taft, Director, Office of U.S. Foreign Disaster Assistance, AID
Brian Kline, Technical Resources, Bureau for Africa, AID

Major Themes

Report of FAO/Rome Meetings—Gudrun Huden

The 86-87 Campaign: an Overview—George Cavin, Consultant

Analysis of Control Operations—Ron Libby, US Forest Service

Conference process/procedures—Jerry Williams, Consultant

PM Simultaneous Workshops (Vision/Strategies)

1. Policies and their implementation
2. Operations and logistics management
3. Survey and control strategies

Evening Scientific presentations on remote sensing and modeling.

Wednesday

AM Report back to full group

-Barriers/problems (full group)

-Problem solving (3 groups)

PM Major Themes

Current Grasshopper/Locust Research—Carl Castleton

Current Locust Campaign: a Status Report—George Cavin

Pesticide Storage Problems—Janice Jensen

Simultaneous Workshops (Vision/Strategies)

1. Pesticides and environmental issues
2. Equipment
3. Training

Evening Presentation on Pesticide trials and environmental assessment.

Thursday

AM Report back to full group

-Barriers/problems (full group)

-Problem solving (3 groups)

PM Final reporting (full group)

Develop table of contents for final report

Develop action plan to produce final report

Adjourn

Workshop Roles

PARTICIPANT ROLE

- Focus on ideas, not people
- Contribute ideas
- Don't be negative
- Listen for understanding
- Be a good listener
- Help Facilitator & Recorder keep in role
- Help stay on schedule
- Allow others "air time"

RECORDER'S ROLE

- Produces group memory
- Helps Facilitator
- Separates ideas
- Captures key words
- Remains neutral
- Checks accuracy thru Facilitator

FACILITATOR'S ROLE

- It's YOUR Meeting
- Process expert
- Not involved in content
- Neutral, open-minded
- Gets everyone involved
- Meeting monitor
- Gets ideas into group memory

GROUND RULES

- Start on time
- Messages
- Smoking — OUTSIDE
- All ideas are valid
- One person speaks at a time
- Make your point & don't dominate
- Respect each other's ideas & opinions
- Listen to understand & not rebut
- Important not to interrupt speakers
- No side conversations
- HAVE FUN!—

Workshop Process

This workshop brought together many of the world's experts on locust/grasshopper management. Because of the unique nature of this opportunity to get input from this group in the preparation of the Operations Guidebook, a process was needed to make maximum use of the limited time available. The process used is known as the "Interaction Method of Meetings Management". Trained facilitators and recorders assisted each working group in reaching the group's desired outcome. Record keeping was done using flipcharts on the walls and easels. These notes were transferred to a computer. The notes were then consolidated and reproduced during the evening and participants were provided each morning with a complete set of the previous days notes. This allowed all participants to be informed on what other groups were deciding and provide input. Participants left the workshop with a complete set of notes from all working groups. The final corrected versions of these notes are included on the next pages.

OPERATIONS GUIDEBOOK

One of the principal desired outcomes of this workshop is the production of an Operations Guidebook for grasshopper/locust control operations. In order to accomplish the final product, certain individuals were chosen to write portions of the guidebook. Several meetings were held with the proposed authors to coordinate production and content. The following guidance was provided:

- **Target audience:** USAID missions
- **Purpose:** To assist Missions in identifying when a problem exists and to specify the steps of an appropriate response.
- **Format:** A 3-ring binder with simple, practical, easy-to-read information with check lists, references, appendices, and a glossary of terms. The approximate length will be 100-150 pages.
- **Editing:** The final product will be edited for continuity and uniformity and organized in a logical order.
- **Review:** Review and validation will be accomplished by AID/W using a simulation exercise with several mission representatives.

Working groups provided a general outline of content and discussion to guide authors in chapter preparation. Working group notes are included here as well as a list of the authors and the probable content of their topic areas.



POLICIES AND THEIR IMPLEMENTATION

PERCEPTIONS

- Deal with AID policies
- World-wide — FAO
- Mission Responsibilities
- Define Problem from perspective of country
- Policies — need to be multi-policy
- Policy related to priorities of AID
- Which office takes lead — program responsibility
- Defining or reviewing policy?
- Existing policies
- Start at transfer from OFDA — AFR Bureau — Missions
- Move from firefighting to prevention
- Gap between disaster assistance & projects — transition phase
- Roles of various bureaus within AID/W. Policies relating to it — Not time dated
- Examine country-specific disaster plans
- Policies to be followed — Decision tree process
- Central Issues — Pesticides, Environment, etc. — Who assumes responsibilities in future
- Maintenance Operation — Long-term strategy — include problem tree
- Multi-donor — extent of policies. How does AID work with other donors. Common policies
- Start with problem — go thru Problem Tree
- Need to set criteria/definitions/parameters?
- Are existing AID policies still valid during transition phase

• Criteria for policies

- Policies — Apply in disaster and non-disaster
- Short-term vs. long-term
- Regardless of responsibilities (OFDA or AFR or ANE)
- Policies need to apply during transition also
- Policies written and accepted by group
- Establish regular review of policies
- Consistency in policy
- Emergency — Transitional — Long-term

- Define policies as they are and what is needed in future
- Take policies in existence — revise if necessary
- When Mission reviews CDSS paper
- Need mid-term and long-term effort — look at during session
- Problem behind each policy
- Who - What criteria

EXISTING POLICIES (OFDA)

1. Respond to Mission request — if valid need from host country.
2. Validation based on assessments/surveys, coordinating committee supplied personnel to validate.
3. Protect Host Country from losing crops leading to famine and need for food assistance.
4. More than crops — include wild vegetation.
5. Use of pesticides — No assistance use for no USG disapproved. Waivers required. Balance benefits/risks.
6. Funded pesticides — paid for disposal and use — offered advice.
7. Response would compliment other donors.

8. Procurement policies. (Disaster, Develop) Where possible — buy American
Pesticides and Equipment
9. Bilateral assistance preferable.
10. Belong to multi-lateral group — FAO
11. Personnel short-term.
 - a. US employee
 - b. CICP
 - c. Foreign National

POLICIES NEEDED

- When to intervene
- Ownership of equipment, pesticides, etc.
- Personnel - short-term
- Missions work within framework of UNDP/FAO or other multi-lateral organization (i.e. use of assessments). Provide flexibility in guidelines.
- Excesses of pesticides. Disposal-Transfer to other countries (may not work) uses w/in country.
- Where management of projects lie.
- Assistance - Crop Protection or locust control.
- Regional perspective.

POLICIES EXPANSION

1 - AID/W

OFDA - special interest in response.

How is Africa Bureau/ANE going to respond? (Regional Bureaus)

Who determines when it is disaster & OFDA would be involved

Policy exists in Aid Handbook 8

Not all missions are in close communication

AFRICA BUREAU STRATEGY FOR GH/L CONTROL

MALI--an example scenario

Conditions: Egg pods — varied concentrations. Average rainfall. Early season outbreak of GH. Not easily contained by CPS. More resources will be needed to control outbreak.

Assessment cable: AFR and OFDA. OFDA — phone call to AFR desk officer — phone call to Mali.

Who did assessment — the experts.

AFR — Call OFDA, TR, Mali

Mali — Coordinated end of season survey

OFDA — Continuation of old situation. Not life threatening. No longer OFDA responsibility

Mali — Operations from previous year were successful. However production was off due to lack of rainfall. Could be in Food Reduction Mode. Food Security is Mission goal

OFDA — Cable other Missions. Find out how big is problem.

At what point and who says this is an emergency and OFDA will handle?

This was predicted and would be handled in AFR Bureau.

What is Mission response?

Long-term — no allocation made at Mission level — Any allocation in AFR Bureau?

Africa Bureau - \$ for research and training but not crop protection project.

Mission - develop plan and costs; re-look at life threatening situation.

OFDA - determines not long-term — walks cable to AFR Bureau — back to Mission budget.

Mission declares emergency.

Alternative: realign AFR budget \$100,000 - no more.

Mali - Local currencies available \$50,000; Other donor input — develops package.

OFDA - Provide partial support.

Fundamental Policy Question: Is AID interested in controlling locust in long-term, concerted way.

- Group agrees ANE Bureau needs strategy to handle GH/L problems.
- AFR Bureau needs to re-evaluate strategy - Evaluation implementation of strategy.
- Countries set priorities
- Coordination between ANE & AFR Bureaus
- Why is AFR Locust Project only focused on research and training?
- Operating Year Budget - flexibility projects vs contingencies. What mechanism exists to set aside Mission funds for emergencies?

POLICY RECOMMENDATION: ANE Bureau and AFR Bureau initiate and revise policy to allow Missions in ABS process to establish a funding category for pre- and post-disaster response measures.

USES OF FUNDS - TO ADDRESS EMERGING PROBLEMS (If above policy implemented)

- Training - CP Agents in use of pesticides aircraft application
- Printed materials
- Prepositioned pesticides
- Conducted assessments funded ground & air teams — per diem & aircraft
- TA - Locust experts, Public Health, Equipment Specialists
- Local procurement — pumps, tanks, nuts & bolts
- Transport of materials
This is not long-term institution building.
- Disposal of containers
- Environmental and Public Health Monitoring

Questions

Role of US in multi-lateral operations
Pesticides use when multi-lateral

Funding mechanism - bilateral vs multi-lateral

Problem: No clear set of signals.

OFDA - Bureaus no clear direction - USAID not take lead, but in the field, AID does take lead

AID OFDA feels FAO should take lead to coordinate in-country assessment and response

FAO/Rome-Paris response was not appropriate/acceptable to OFDA

Senegal government asked USAID to take lead

FAO not capable of handling problems

Should we have (require) FAO staff up, since US provides funds

Still important to have FAO coordinate

Difficult to get FAO to respond

SUMMARY

All know FAO has responsibility (policy)

But what happens if FAO doesn't produce? Doesn't take lead
Country-specific response; OFDA sent team to fine-tune response

Mission needs further guidance; may be country specific

Missions need to take stronger role in identifying what US can do rather than have FAO give directions

OFDA sees this as negotiable — not FAO solely

WEDNESDAY AM

Group recommended that the term "policies" be changed to **MANAGEMENT GUIDELINES.**

Issues to consider:

- Transitional phase. Problem is funding.
- 5 - Procurement
- 16 - Overall development problem - locusts
- Tomorrow am: Transitional plan for Sahel-AFR Bureau
- 6 - Staffing
- 4 - Table 1 revision
- 1 - Roles of REDSO
- 7 - Local organization & FAO campaigns
- Recommendations to go back to AFR & ANE Bureaus and contracts for decisions
- 2 - Training
- 4 - Bureau response - ANE needs to be involved in discussions
- 3 - How will communications continue. Cable traffic — Add ANE and Missions

AGENDA FOR WEDNESDAY PM TRANSITIONAL PHASE

- Mission needs to identify long term or immediate
- Include:
 - Staffing
 - Training
 - Procurement procedures (who, how, cash management)

- REDSO
- Communication

- Transitional funding
- What can Missions expect from AFR and ANE Bureaus
- Mission concerns
- Roles and responsibilities
- Timing of transition
- Research (long term)
- Training (long term)

- ATTENDANCE:
- Bessie
 - OFDA
 - Dagnija
 - Louise
 - Missions

PURPOSE: Talk to individuals from Sahel. Identify needs, funds available, follow-up needed from Missions.

INVITEES: Missions, Bureaus, OFDA

Concerns to go forward

Transitional issues to be addressed by ANE and AFR Bureau heads in cable back to Mission. **POLICY STATEMENTS AND MANAGEMENT GUIDANCE.**

2 hours Thursday am

Note: A meeting was held on Thursday morning with the Regional Bureaus, OFDA, and Mission representatives. The notes from this meeting were kept separately from the workshop.

ROLES OF ORGANIZATION IN DISASTER

- With shrinking budgets, use what's available regionally
- FAO not necessarily qualified. US put condition on FAO
- Mechanism for plugging gaps
- Consider FAO contracting
- Identify role FAO has to play — policy issue
- FAO needs to recruit qualified staff
- National programs must be developed
- FAO role
 - Supporting role
 - Standardization
 - Support of training
 - Provide aircraft operation development management — PERT chart for national program
 - TA to national institutions
- How to get feedback/communications back to FAO
- Official response to FAO on project
- FAO should be responsive because of US budget input — however, FAO may request more funds

OPERATIONS AND LOGISTICS

OUTCOME STATEMENT: List recommended guidelines for developing an operations and logistics plan for grasshopper/locust control programs.

SIX STEPS TO SQUASHING BUGS

1. Problem identification.
 - Entomology report
 - Technical Assistance needed
 - Sources:
 - Local Ministry of Agriculture
 - FAO and AID Office
2. Fact Gathering and Resource Identification
 - Training
 - Size of the problem
 - Economic consequences
 - Hectare (size)/geographic location
 - Resources available and validity of information (checklist*)
 - Communications
 - Time constraints
 - Safety
 - Staffing
 - Local contracting ability
 - Host government regulations
 - Other concerns and constraints, i.e. aviation and military
 - information, re: local wind conditions
 - environmental
 - public information and safety
 - communications (type and frequencies)
 - vehicles (type and availability)
 - roads, maps, (transportation system), aerial photos...
 - labor (availability and impact on local economy (+/-))
 - crash rescue and SAR
 - policy - host country
 - local politics
 - dollars available for project
3. Develop alternative strategies
 1. Long term
 2. Mid term
 3. Short term
 - High cost/low cost
 - Time frame - can alternative meet "window"
 - Policies - USAID and host country
 - Treatments: chemical/non-chemical;
 - Type: powders & liquids and quantity & availability
 - Ground/air
 - on foot - small aircraft A & B
 - vehicle - large aircraft C & D
 - Availability of POL for alternative
 - Environmental impact
 - Donor mix (role, funding, supplies, equipment)
 - Domestic capacity
 - Probability for success
 - Response time (getting things in place)
 - Availability of resources CHECKLIST
 - Technical assistance (type and availability)
 - Political acceptance

- Public safety
- End result (evaluation, mtng objective, mortality survey...)
- Objective
- Sustainability of planned operations
- Identify preferred alternative

4. Select Alternative by Line Officer

- Use common sense
- Advice of technical experts
- Considerations:
 - Does it meet criteria
 - Safety (public, management and operator personnel)
 - Environment
 - Cost
 - Benefit
 - Political
- Institutional approval process loop

NOTE THIS IS THE AUTHORITY TO PROCEED

5. Develop and implement final plan

Who What When Where How

- Identify activities
 - survey
 - procurement
 - personnel (host government and local hire)
 - transport
 - equipment
 - establish field communication network
 - control activity
 - funding
 - customs clearance
 - training

PROJECT OPERATIONS PLAN: daily briefings, debriefings and reports, daily objectives and unit logs

ELEMENTS:

- organization chart
- transportation plan
- communications plan (including operations and logistics)
- air operations plan (with pesticide handling)
- ground operations plan (with pesticide handling)
- safety plan
 - emergency decontamination and containment
 - crash rescue
 - search
 - medical
- field survey and marking (include monitoring deposition)
- logistics plan
- public affairs plan
- field support plan
- facility plan

SUPPORT AND SUPPORT EQUIPMENT

A. Ground vehicles

- use (number and type, i.e. 4-wheel drive)
- petroleum/oil/lubricants (POL) supply
- maintenance capability and parts

- drivers
- maps
- insurance
- communications needs
- safety, training and equipment

B. Training Equipment

- ground control
- camping equipment
- back pack and dusters
- facilities
- personnel
- communications
- trainers
- materials, paper supplies, etc.
- first aid
- authorization permits
- funding/per diem
- training plan
- protective gear
- identify trainees

C. Insecticide Application

	aerial	ground
- equipment	yes	
- authorities	yes	
- guidance	yes	
- safety	yes	
- communication	yes	
- personnel/qualified		yes
- facilities	yes	
- air strips		no
- maps	yes	
- fuel POL	yes	
- water trucks	yes	
- insecticides	yes	
- trucks	yes	
- loading equipment	yes	
- ground support		no
- air operations management plan		ground ops
- clearances	yes	
- fire protection	yes	
- crash search and rescue	yes	
- exonerations		yes
- wash-down equipment	yes	
- training program	yes	
- labor pool	yes	
- contract management	yes	
- personal protective equipment	yes	
- technical expertise	yes	
- spare parts	yes	
- mechanics	yes	
- security of equipment	yes	
- operating funds	yes	
- aux. lights	no	
- ground markers	yes	
- disposal of containers		yes
- secure pesticide storage area	yes	
- public education	yes	
- public health and safety	yes	
- labeling of pesticides		yes

4

SUMMARY:

1. Survey
2. Prediction
3. Control measures or tactics
4. Decision-making
5. Implementation

1. SURVEY (Several methods)

- Measure quantity of locusts on ground
 - Standardize measurement size
 - AID methods used:
 1. Ring (purpose for applicator to visualize location. Used in beginning of survey).
 2. Square Meter (most common)
 3. Transect (improve determination)

First identify the density, then determine method.

Use Table developed by PRIFAS
(consider clean vs. vegetated field.)

SURVEY - (Spatial, temporal, numerical)

GRASSHOPPERS-

- Ground-
Life stages-
 - eggs
 - larvae
 - adults
- Air-
—Remote Sensing

LOCUSTS-

- Ground-
Life stages-
 - eggs
 - larvae
 - adults
- Air-
—Remote Sensing

2. PREDICTION-

- PRIFAS model and other models.
- Simplistic prediction tools
- End of season survey for egg laying adults.
- Re: Migratory Grasshopper in early movement stage
 - predict movement
- Predict egg deposit
- Long range weather — historical records
- Crop production and vulnerability
- Remote sensing (compare last year's maps for green areas to predict egg laying areas)
- Current rainfall data
- *Crop value
- *Resource value
- *Value related to country production.
- Expected loss of crop related to time (life stage of plant)

3. CONTROL MEASURES/TACTICS—

- Organic pesticides
- Early vs. late season
- Liquid vs. dust vs. bait
- Temporal scale
- Kinds of measures/tactics
- Stage specificity (insect)
- Material vs. equipment availability — what, where, when.

- Delivery vehicle (air, ground, etc.)
- Type of formulation
- Who will apply
- Delivery system
- Efficacy/persistence
- Biological & alternative methods (lasers, SDI, etc)
- Specific research (e.g. equipment design
- Side effects
- Environmental

4. DECISION-MAKING—

- Who, what, where, when, why, how?
- Treatment thresholds
- Action Plan
- (Crop) Value of resources endangered
- Survey results
- Cost benefit
- Recommendations of the surveyor
- Budget availability
- Resources available
- Other donor commitments
- Politics
- Level of decision
 - biological
 - budgetary/political
- Health & Environmental
- Interaction with other pest programs
- AID Reg. 16
- Threatened & Endangered Species Act
- Local Regulations
- International Code of Conduct
- Private sector pesticides used
- Political pressure driven
- How are decisions made?
- Dynamics of process related to personalities, countries, agencies
- U.N. / Donor Recommendations
- Levels of Local Decision-
 1. On Site
 2. Project Director
 3. International
- Define current process, then long-term/vision — improved model.
 - Reliable information/survey results
 - Specific conditions of each country (infrastructure)

5. IMPLEMENTATION TIMELINE—

- Set up Center of Operation & committee of cooperators
- Good communication system
- Transportation
- Logistics
- Trained personnel
- Adequate technical assistance
- Dedicated & developed infra-structure
- Realistic evaluation of available resources
- Timing of delivery of resources
- Monitoring of implementation process (for feedback...)
- Coordination with other donors

- Objectives
- Evaluation of implementation
- Ground vs. aerial application
- Implementation supervision
- How to deal with end result
- "De-implementation" (demobilization)
- Public Relations (PR)
- Data recording & analysis
- Production of "Guideline Handbook"
- Budget management
- Future research needed & adjustments to be made
- Sustainability in host country.
- Project development
- Establish resource/personnel list (Institution database)
- Appendix Contents:
 - Institutional Database
 - Exchange with other countries/agencies
 - Research available/needed
- Programming

————SUMMARY OF FINDINGS————

1. SURVEY

Components:

- Preseason Analysis —
 - using previous year end of season data
- Reconnaissance/Detection —
 - Identify high probability areas using all possible data such as rainfall, remote sensing, anecdotal evidence. Look for populations of insects in these areas
- Sample/Insect populations —
 - Systematic counting
- Reporting and data analysis—
 - Standardized reporting and recording
- Delimit Target Areas—
- Resurvey Area —
 - (if lag time before treatment is too long)
 - Treat parcel
- Post Survey Analysis —
- End of Season Work —
 - monitor laying adults, damage, eggpod survey

Characteristics of a Good Survey	
— Species identified (sample if in doubt.)	
— Date & time	
— Good ground reference	
— Weather, recent rainfall	
— Density - per square meter	
— Population composition	
— Vegetation & land use	
— Previous control at site	

ADDITIONS TO 1/19 SURVEY AND CONTROL REPORT

- Add mosaic/matrix for ground/air/species (2 tables, air & ground by species)
- Existing: Threshold Table (PRIFAS) addresses area
- In Appendix or Bibliography, include:
 - a reference list
 - tables of use to AID Mission

—Range of treatment area per day (in hectares):

Method	Hectares
1. Indiv. hand dusting	.7-1.3/person
2. Hand pump sprayer	2/person
3. Backpack sprayer (motorized)	7-10/person
4. ULVA - micron	5/person
5. Vehicle mounted sprayer	200-400
6. Small plane/helicopter	500-2000
7. Large plane	20,000

— Concern:

- Environmental Issue-
- Neighboring towns
- People in general
- Waivers effect on this issue
- Need guidelines-
- Carroll Collier, author, will address
- Monitor spray teams re: health and safety.
- Concentrate on aerial spraying
- Also address ground application
- Most application is by air especially in a disaster situation.

Concerning re: aerial spraying:

- Ground support team must meet plane needs (i.e. radio communication - ground to air)

Note to Author:

- Address following:
 - FAO monograph on safety concerns
 - Cholinesterase inhibition
 - Cost of treatments

2. PREDICTION-

- Effective prediction depends on long term assessment (e.g. locust)

—A. Methods-

- Long-term — Multi-year
- Short-term — Seasonal, i.e. hatch - mortality

—B. Techniques - survey, mapping, mensuration, modeling

—C. Data Requirements -

- Densities
- Mortality
- Migration
- Current rainfall
- Historic rainfall
- Long range weather
- Historical records
- Egg pod occurrence
- End of season surveys
- Remote sensing - i.e. "greenness" mapping
- Soils
- Vegetation - biomass
- Crop areas, production, vulnerability

—D. Modeling -

- correlation
- simulation
- pure math models
- combined

—E. Communication -

- Prediction data must be available.
- timelines of reporting

—F. Validation Process -

- reliability of data
- degree of reliability of modeling
- requirements of decision-makers changes levels of validity

—G. Results -

- prediction of occurrence of pest
- prediction of crop loss
- value of loss related to country production
- prediction related to decisionmaking

3. CONTROL METHODS

—Methods-

I. Chemical-

A. Efficacy

- Resistance
- Formulation
- Delivery systems
- Toxicity LD50
- Timing
- Persistence
- Phytotoxicity

B. Environmental Concerns

- Human effects (exposure)
- Nontarget
 - beneficials
 - terrestrial/aquatic
- Impact on other control programs

II. Biological & Natural Products (Neem)

III. Cultural

Issues for discussion:

- Dust vs. bait. vs. ULV vs liquids
- Large vs. small planes
- The "drift concept"
- Rangeland vs. Crops
- Crop Phenology
- Delivery Systems
- Novel Approaches (lasers!)

4. DECISION-MAKING

A. Level of Decision

1. Local
2. Project Director
3. International

B. Basis for Decision

1. Survey results/Recommendations
2. Treatment thresholds (Crop value/Cost benefit)
3. Resources Available
4. Reliable info.
5. Health & Environment

C. Constraints

1. Other donor commitments
2. Politics
3. AID Reg. 16
4. T & E Act
5. Local Regulations
6. Internat'l Code of Conduct
7. Specific conditions of each country (infrastructure)

D. Output

1. Action Plan (termination of program)
2. Long-term vision
3. Establish improved model

5. IMPLEMENTATION

A. Host Country est/chair coordination committee (w/donors)

B. Est. agreement on nature of problem & desired control measures

C. Develop plan for implementation to include:

1. Identify equipment, pesticides, personnel needed for response/timing needed.
2. Identify which items in (C.1.above) are available in country & which needs to be from donors.
3. Identify & secure funding & support. Develop budget mgmt.
4. Ensure logistic/transport. is well planned & communications network exists.
5. Monitor implementation process - feedback.
6. Record & share data in country & region.
7. Plan for demobilization
 - disposition of equipment
 - storage unused pesticides
 - evaluation
 - lessons learned

D. Develop framework for future activities.

1. Identify future research
2. Develop projects for host country
3. Produce guidebook
4. Train

PESTICIDES AND ENVIRONMENTAL ISSUES

PESTICIDES - LOCUST/GRASSHOPPER CONTROL

- Dieldrin
- Lindane
- Acephate
- Chlorpyrifos
- Diazinon
- Fenitrothion
- Malathion
- Bendiocarb
- Carbaryl
- Propoxur
- Cypermethrin
- Lambda-cyhalothrin
- Tralomethrin

FAO RECOMMENDED PESTICIDES

- Bendiocarb
- Carbaryl
- Lambda-cyhalothrin
- Propoxur
- Dieldrin
- Lindane
- Chlorpyrifos
- Diazinon
- Dichlorvos
- Fenitrothion
- Deltamethrin
- Esfenvalerate
- Malathion
- Alphacypermethrin
- Teflubenzuron

PESTICIDES NOT RECOMMENDED BY FAO — (further testing necessary)

- Carbosulphan
- Acephate
- Cyfluthrin
- Phoxima
- Phoximand
- Propoxur
- Pirimiphos-methyl
- Permethrin
- Prothiofos
- Pyridaphenthion
- Esfenvalerate
- Tralomethrin

GROUP CONCERNS

- Disposal
- Persistence - bio-accumulation
- toxicity
- Habit at specific effects (non-target)
- Accidental poisoning (people, habitat)
- Public health & safety
- Handling & storage specifications
- Problems of operating chemicals with other countries
- Ease & applicability of pesticide application
- Formulation stability & dosage problems

- Bio-accumulation -
- Direct contact with people
- Food chain for humans
- As related to environment
- Pesticides should be compatible with host country needs
- Re: locust control - how much must we go beyond program assessment (especially A & E)
- Mission concerns re: AID Reg. 16 environmental procedures
- Pesticide formulating plants
- Specifications for formulation
- Establish 'general pesticide' policy (beyond L/GH)
- UNEP: social & legal responsibilities
- Packaging/labelling
- What to do with excess pesticides
- Transportation
- Pre-positioning
- Spot checking for residual as (before, during, and after application)
- Disagree with FAO's cocktails pesticides
- Impact on non-target species
- Guidelines on application
- Training (applic., handling, storage, clothing)
- Policy re: container storage; who is responsible
- Coordinate w/ other donors regarding quantity
- Pre-shipping of pesticides; pros, cons
- Mission must know procurement procedures
- Inventory
- Compatibility of pesticide and application equipment
- Cost comparison of pesticides
- Concern - different formulations of pesticides by different donors
- Barrier zone concept
- Research (needs/available)
- Synergy of pesticides
- Alternatives for control (other than chemical)
- Detoxification of handlers
- Liability
- Protective gear
- Guidelines for national disposal
- Test handlers / monitoring health (CHE)
- Spill clean-up
- Public awareness / Public relations
- Time of donation
- Overspray
- Resistance management (re: GH)

CHRONOLOGICAL SEQUENCE OF ACTIVITIES

1. Donor Coordination & Procurement
 - Handling & storage spec's
 - Handling chem's w/ other countries
 - Inventory
 - Pre-positioning
 - Cost comparison of pesticides
 - Different formulations by different donors
 - Barrier concept
 - Synergy of accum. pesticides
 - Reg. 16
 - AIDSpecs for formulation
 - Time of donation

REPORTING OF WORK GROUPS -- A SUMMARY
PESTICIDES AND THE ENVIRONMENT

I. PROCUREMENT & DONOR COORDINATION

A. Handling & Storage Specifications

— In English, French, Arabic

— In accordance with Int'l Code of Conduct (FAO)

— AID Regulation 16

B. Mission should emphasize the early development of a program operations plan to ensure donor coordination of all contributions, i.e. pesticides (kinds, % concentration, etc.), equipment in relation to host country needs (see sample operations plan).

C. Procurement: Mission and host country government should procure pesticide early enough to ensure contracting, shipment, in-country receipt & field placement prior to start of operations.

D. Pesticide Management: In operations plan, preferred means is to ensure no two pesticides are used in a given area with CPS control on what pesticide is used where.

II. HANDLING & TRANSPORTATION OF PESTICIDES

A. Transport -

1. Airport vs. Port

— depends on:

- urgency of need
- cost considerations

2. Issues

— Offloading

- Is there a forklift
- Storage area
- Safety (spill, medical aid, etc)
- Staff (laborers)
- Trucks
- Customs clearance
- Forms pre-prepared
- Length of time
- Consignee. Who?
- Local CPS? Other?
- Uniform consignee for all donations
- Storage (a decision)
- Where is product to be stored after customs clearance?
- direct delivery from port to field station (end use)
- delivery to holding area

B. Storage -

1. Distribution Plan

— With CPS consider:

- existing capacity (i.e. are warehouses full?);
- holding reserve at central point for contingency;
- intensity of problem (priorities)

- Establish gen'l guidelines for procurement (beyond L/GH)
 - Social & legal responsibilities
 - Packaging / labelling
 - Re-deployment
 - Disagree with FAO's combination of pesticides
 - Policies on pesticide storage responsibility
 - Coordination with other donors for quantities of pesticides
 - Preshipment of pesticides (pro/con)
 - Procurement procedures
 - Pesticide be compatible with host country needs
 - Liabilities
 - Procurement of protect. gear, etc.
2. Handling & Transportation
- Disposal (how, cost, who)
 - Accidental poisoning
 - Public Health & Safety
 - Handling & Storage
 - Inventory
 - Formulation plants
 - Packaging & labeling
 - Excess pesticides
 - Transportation & redeployment within country
 - Training
 - Formulation stability
 - Detoxification of handlers
 - Liabilities
 - Protective gear
 - Spill cleanup
 - Public awareness
3. Application Issues & Environmental Impacts
- Habitat (non-target)
 - Accidental poisoning
 - Public health & safety
 - Compatibility of application equipment
 - Use of different formulation
 - "Barrier Zones"
 - Synergy: lethal stew.
 - AIDReg. 16 waivers
 - Formulating plants
 - Spot checking
 - Disagree with FAO combinations
 - Impact on non-target animals
 - Guidelines on application
 - Training
 - Ease and applicability of pesticides
 - Formulation stability
 - Bio-accumulation
 - contact with people
 - food chain
 - environment
 - Detoxification of handlers
 - Liabilities
 - Overspray
 - Resistance management

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2. Points to consider:

- Security
- Protection from heat & rain
- Adequate ventilation
- Inventory control
- Provision for spills/accidents
- Separate pesticides from equipment
- Don't stack containers

C. Disposal -

- Containers
- Liquids
- Solids

1. Containers

- Disposal should be built into the program and budget accordingly.
- Methods:
 - (Clean) Punch holes, burn, & bury; drums not re-used
 - Clean, detoxify, re-use (not for potable water or food)
 - Flatten & bury
- Safety guidelines at disposal site:
 - Dispose away from human habitation.
 - Punch holes in containers
 - Use gloves/protective gear (when handling lye)
- Logistics to consider:
 - Trucks
 - Laborers
 - tools (punching holes, etc.)
 - fuel (for transport & burning)
 - bulldozer (for burial)
 - procurement of detoxicant
 - disposal of rinseate

2 & 3. Liquids & Solids (existing / on site)

- Not part of an emergency program; probably a case of old and/or outdated chemicals posing an environmental threat.
- Treat as medium/long term problem
- Seek guidance on whether this should be a Mission activity.

D. Health & Safety -

1. Applicator

- Training in Health/Safety
- Personal Protective gear
- Up-wind from chemical
- Soap & water for clean-up
- First Aid supplies
- CHE Monitoring
- Appropriate transfer equipment (i.e. pumps)

2. The General Public

- Public Safety messages in local language advising people to stay clear; keep animals away (because of toxic chem)

E. Packaging & Labelling -

1. Container specifications

- Sturdy; for tropical conditions
 - Important to specify at procurement stage (heavy metal, reinforced bags, etc.)
- Choice of container (drums, bags, etc.) depends on:
 - kind of pesticide (dust, liquid)
 - conditions of transport, storage
 - number of times handled
 - weight or volume of material

2. Labeling Criteria (request at procurement stage)

- Well attached label and, preferably, painted, stenciled markings on containers
- Labels written in local language; also English or French.
- Labels to include:
 - handling instructions
 - application spec's (dosage)
 - contraindications (symptoms / treatment for poisoning)

F. Re-deployment of Pesticides - (within and between countries)

III. ENVIRONMENTAL IMPACT

A. Application Guidelines/Standards -

- Formulation
 - use of
 - stability (assure)
- Training
- Public Health & Safety Guidelines
- Handling & Safety Measures
- Eliminate Overspraying
- Ensure proper delivery -
 - calibration
 - droplet size, etc.
- Guidelines for "Barrier Zones"
- Synergistic "Lethal Stew" Problem

B. Ecological Concerns -

- Table which considers and provides Guidelines for:
 - beneficial insects, etc.
 - vegetation
 - wildlife
 - aquatic resources
 - hydrologic aspects
 - domesticated animals
 - endangered species
 - bio-diversity
 - toxicity & bioaccumulation
 - resistance management
- Monitoring:
 - above
 - formulating plant
 - disposal methods

- C. Health & Safety -
 - Training
 - Detoxification procedure guidelines
 - Accidental poisoning
 - Spot checking
 - sprayed areas
 - formulating plants and workers
 - disposal methods
 - Spills management
 - Evacuation procedures

- D. Regulatory -
 - AID 16 waiver
 - Liability/responsibility
 - National Pesticide Usage Codex

IV OTHER ITEMS NOT ADDRESSED:

- How far should we go past program assessment; re: locust control (especially A&E)
- Research (available/needed)
- Alternatives for control other than chemical
- Guidelines for national disposal

EQUIPMENT

OUTCOME STATEMENT - List recommended guidelines for selection and use of equipment

Six major equipment need areas.

- Ranked: 1 = Essential equipment, an absolute need
 2 = Important equipment and may depend on situation
 3 = Useful equipment to have

1. Survey Equipment Needs

- compass - 1
- maps - 1
- camping gear - 2
- 4x4 vehicle - 1
- thermometer - 1
- fixed-wing aircraft - 2
- helicopter - 2
- marking (flagging) - 1
- communications - 1
- mosquito netting - 1
- receiving data from outside
- cots - 1
- first aid kit - 1
- shovel - 1
- pick - 2
- ax - 2
- jumper cables - 1
- jerry can - 1
- environmental sampling kit - 1
- grasshopper nets and collection - 1
- alcohol - 1
- binoculars - 1
- coolers - 1

- water - 1
- cooking facilities - 2
- food - 1
- can openers - 1
- remote sensing data - 2
- weather equipment - 1
- wind gauge - 1
- insect specimen box - 1
- generator - 2
- rain gauge - 2
- Grasshopper/Locust identification key - 1
- hand counter - 1

2. Air Equipment Needs

- ground marking crew - 1
- shovel - 1
- pesticide application equipment - 1
- communications with spare batteries (non-rechargeable) - 1
- safety equipment - 1
- aircraft - 1
- ground facilities - 1
- fuel - 1
- insect repellent - 1
- oil and lubricants - 1
- materials handling equipment - 1
- fire fighting equipment/extinguisher - 1
- pesticide handling - 1
- field transfer equipment - 1
- fuel and pesticide pumps - 1
- fuel filters (lots) - 1
- jars for water testing - 1
- battery operated calculator with spare batteries
- chamois - 1
- compass - 1
- computer - 3
- generator - 1
 - aircraft
 - electric
- lighting kit - 1
- camping gear - 1
- wind sock - 1
- weather instruments - 1
- fork lift - 1
- shade - 1
- storage containers (conex box) - 1
- transportation - 1
- dry break system - 1
- portable runway markers - 1
- portable running lights - 1
- portable radio beacon - 1
- protective clothing - 1
- wash down equipment - 1
- jerry cans - 1
- pesticide tank and pumps - 1
- maps - 1
- large truck for transport - 1
- pesticide - 1
- funnels - 1
- rags - 1

- rope - 1
- toilet paper - 1
- fiber tape - 1
- duct tape - 1
- scotch tape - 1
- water supply and potable water - 1
- sanitary facilities - 1
- soap, water, towels, eye wash - 1
- first aid kit - 1
- cat litter - 2
- security - 1
- chocks and tie downs - 1
- ladder - 1
- bung wrench - 1
- tool box with tools - 1
- binoculars - 1
- flash lights with spare batteries - 1
- office supplies - 1
- pads, paper - 1
- folding table - 2
- lawn chairs - 2
- hoses - 1
- antenna poles and stakes - 1
- stress reduction facilities - 2
- air pump compressor - 1
- hand sprayers - 1
- hydraulic jack - 1
- contract laundry facilities: (to wash personal protection equipment) - 1
- cots - 1
- video camera/film/batteries, etc. - 2
- mosquito netting - 1

3. Ground Spray Equipment Needs

- shovel - 1
- pesticide application equipment - 1
- communications with spare batteries (non-rechargeable) - 1
- alligator clamps -
- safety equipment - 1
- aircraft - 2
- ground facilities - 1
- fuel - 1
- insect repellent - 1
- oil and lubricants - 1
- materials handling equipment - 1
- fire fighting equipment/extinguisher - 1
- pesticide handling - 1
- field transfer equipment - 1
- fuel and pesticide pumps - 1
- fuel filters (lots) - 1
- battery operated calculator with spare batteries - 1
- compass - 1
- computer - 3
- generator -electric 1
- lighting kit - 3
- camping gear - 1
- wind sock - 2
- weather instruments - 1

- fork lift - 1
- shade - 1
- storage containers (conex box) - 1
- transportation - 1
- portable runway markers - 2
- portable running lights - 3
- portable radio beacon - 2
- protective clothing - 1
- wash down equipment - 1
- jerry cans - 1
- pesticide tank and pumps - 1
- maps - 1
- large truck for transport - 1
- pesticide - 1
- funnels - 1
- rags - 1
- rope - 1
- toilet paper - 1
- fiber tape - 1
- duct tape - 1
- scotch tape - 1
- water supply and potable water - 1
- sanitary facilities - 1
- soap, water, towels, eye wash - 1
- first aid kit - 1
- cat litter (to soak up spray spills on the run way) - 2
- security - 1
- chocks and tie downs - 2
- ladder - 1
- bung wrench - 1
- tool box with tools - 1
- binoculars - 1
- flash lights with spare batteries - 1
- office supplies - 1
- pads, paper - 1
- folding table - 2
- lawn chairs - 2
- hoses - 1
- antenna poles and stakes - 1
- stress reduction facilities - 2
- air pump compressor - 1
- hand sprayers - 1
- hydraulic jack - 3
- contract laundry facilities (to wash personal protection equipment) - 1
- video camera/film/batteries, etc. - 2
- mosquito netting - 1
- cots - 1

4. Operational Control Equipment

- office equipment - 1
- computers and software - 2
- communications - 1
 - telephone
 - radio
 - command
 - logistics
- flip charts and paper - 1
- maps - 1
- bulletin board - 1

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- overlay material - 2
- magnetic boards - 3
- magic marker pens - 1
- copy machine - 2
- trans. tape, scissors, paper, pencils, clips, etc. - 1
- spray card analysis system - 2
- video equipment and tape - 2
 - camera/film/batteries
 - slide projector/screen/extra lights
- reference materials - 1
- filing equipment - 1
- chairs - 1
- clerical help - 1
- desks/tables - 1
- vehicles - 1
- personnel - 1
 - guards
 - secretaries
 - drivers
- programmable calculators, inst. book, supplies - 1
- computer paper/ribbons/PRINTER - 2
- box of assorted cables - 2
- refrigerator - 2
- freezer (if camp) - 2
- extension cords - 1
- socket strips and wiring - 1
- transformers - 1
- adapter plugs - 1
- air conditioner - 1
- fans - 2
- humidifiers - 3
- screening and mosquito net - 1
- cots - 1

5. Training Equipment Needs

- facility (place) - 1
- instruction manual - 1
- equipment that people are being trained to use - 1
- take care of per diem, lodging, transportation - 1
- t-shirts (award), hats, ball caps - 3

6. Ground Guidance Equipment Needs

- shovel - 1
- communications with spare batteries (non-rechargeable) - 1
- safety equipment - 1
- aircraft - 1
- ground facilities - 1
- fuel - 1
- insect repellants - 1
- oil and lubricants - 1
- materials handling equipment - 1
- fire fighting equipment/extinguisher - 1
- field transfer equipment - 1
- fuel and pesticide pumps - 1
- fuel filters (lots) - 1
- jars for water testing - 1
- battery operated calculator with spare batteries
- compass - 1
- generator -electric - 1

- lighting kit - 3
- camping gear - 1
- weather instruments - 1
- shade - 1
- storage containers (conex box) - 1
- 4x4 vehicles - 1
- portable runway markers - 1
- portable radio beacon - 1
- protective clothing - 1
- wash down equipment - 1
- jerry cans - 1
- pesticide tank and pumps - 1
- maps - 1
- large truck for transport - 1
- rags - 1
- rope - 1
- toilet paper - 1
- fiber tape - 1
- duct tape - 1
- scotch tape - 1
- water supply and potable water - 1
- sanitary facilities - 1
- soap, water, towels, eye wash - 1
- first aid kit - 1
- cat litter - 3
- security - 1
- ladder - 1
- tool box with tools - 1
- binoculars - 1
- flash lights with spare batteries - 1
- office supplies - 1
- pads, paper - 1
- antenna poles and stakes - 2
- stress reduction facilities - 3
- air pump compressor - 3
- hand sprayers - 3
- contract laundry facilities (to wash personal protection equipment) - 1
- mirrors - 1
- strobe light - 1
- mosquito netting - 1
- cots - 1

NOTE TO AUTHORS WHEN PREPARING EQUIPMENT CHAPTER:

- There is a need to address the various types and sizes of equipment and specifications so that the Mission can determine what equipment to use in a specific situation. For example, a Mission needs a generator to set up a base camp...they need to know that the generator is portable, what KVA voltage, frequency needs, what fuel, etc. they will need to request.

- National and cultural acceptability of equipment needs to be addressed.

TRAINING

Current Issues in GH/L Campaign in Training

- Level of training — CP Staff or trainers
- Types of training appropriate for level
- Materials — who, what, where, when
- Relationship of AID training to other training programs
- Training of farmers (audience) Crop Protection Personnel
- Organizational training
- Management/organization training — higher level, personnel management, budget, planning
- Management guidance on who is responsible for what training
- Structured approach for identifying training needs
- Technical vs Management training
- Manuals/Job aids
- Access to libraries. Develop library of materials
- Training in use of map and grid coordinates — land navigation
- Formal training in radio communications
- Training of expert consultants before going to field — cultural sensitivity/language skills
- Bilingual lexicons
- Identification of needs/Responsibilities for filling needs
- Reproducibility of materials
- Sustainability
- Evaluation of training programs — who
- Certification programs
- Research on development of training materials for audience
- Need workshop on training
- Identification of what's out there — French, German, etc.
- Train trainers, institutionalize
- Training in options — technology transfer
- Safety — Pesticides, Detection, Surveying, Application, post-count
- Farmer level — training level — AID Staff, labor crews, pilots, crews
- Public at large — information over radio or training — educate public
- Use of greenness maps — availability of training of field staff length
- \$ Pesticide storage for hi-level managers
- Materials geared to appropriate audience — background materials available to all groups
- Pilot training — loading personnel
- Indoctrination of pilot & crews on grasshoppers—Their responsibilities & understanding of problem
- Organization training - Donor coordination training — how to get best from donors
- Documentation of trainer's capabilities — directory
- Train HCG in contracting management
- Logistics and operations training — OJT customs
- Prioritize training needs of countries
- US training at degree level — expand cadre of degree level people in countries
- Linking needs in locust training to on-going AID training programs
- Language training
- Develop practical manuals to be used after training
- Role of Peace Corps and Non-government Organizations

- Country specific training — continue
- In-country vs US training
- Technology transfer back to home country after US training
- Follow training thru to farmer level after TOT
- AID Mission training on histories of past campaigns/programs
- Maintenance training
- Which institutions overseas are more cost-effective than US institutions — Document: who, where, costs
- Acceptability of US degree training in francophone Africa

1. Training roles and responsibilities

- a. AID/W - central funding
- b. Mission -
- c. Other donors
- d. Contract-consultant

2. Levels of training and target audiences

- a. Higher degrees (MSC and PHD)
 - Intermediate
 - Practical skills
- b. Target
 - Upper management (policy makers)
 - top level supervisors (crew leader)
 - CPS agents (regional)
 - Extension agents
 - Workers
 - Farmers
 - Agricultural in-country schools
 - Consultants and experts (orientation)
 - Pilots and loading personnel
 - AID mission (orientation for new staff)

3. Type of training

- a. technical vs management
 - priorities
 - need assessments
- b. list of possible training topics that might be required
 - language training
 - logistics and operations training
 - maintenance
 - pesticides storage
 - use of maps, grid coordinates, land navigation

tion

- safety pesticides
 - detection, surveying, application, pest count
 - radio communication and operation
 - organizational/management
- NOTES

- * Selecting the type of training to a particular target audience
- * Type of training should fit the needs
- * Training request often based on perceived problem but should rather be subject to analysis to determine if any is really needed.
 - * Type of training should be prioritized according to specific needs of each country

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4. Materials

- Development
- Distribution
- Format
- Language
- Acquisition

5. Location of training

- In-country
- US
- 3rd country

6. Training followup

- Evaluation
- Certification

7. Followup on this meeting

1. Training roles/responsibilities

- Crop Protection, including
Grasshopper/Locust Problem and other pests
- Central level
- Mission level
- Other donors
- National Crop Protection Service
- National Extension Service

GROUP AGREEMENT.

Primary responsibility for training is with Host Government and its appropriate agencies.

Donors provide support to HC institutions, including needs analysis and development of training plans and response to need (possible training sites).

Mission provides support as donor.

AID W level provides technical, support to develop and duplicate materials and training methodologies.

2. Education vs performance based training

3. Materials compilation data base

4. Training directory (skills compilation)

5. Funding levels

- Central level \$300,000 - 480,000 (top) for all African countries involved in project

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GRASSHOPPER/LOCUST EVALUATION WORKSHOP

**PARTICIPANTS
GRASSHOPPER/LOCUST EVALUATION WORKSHOP**

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GRASSHOPPER/LOCUST CHRONOLOGY

Chronology

Pest Outbreaks in Africa

<u>Time</u>	<u>Country</u>	<u>Activity</u>
<u>1985</u>		
early September	Sudan	Heavy infestation of locusts reported
mid-September	Mali	Grasshopper outbreak in north central Mali affecting 200,000 ha. (<u>Oedalus sonegalensis</u>)
mid-September	Mali	FAO expert George Popov assists GRM in putting together control plan
late September	Mali	GRM/FAO control program begins
late September	Mali	UNDP contributes \$100,000 for grasshopper control
late September	Mali	FAO contributes \$238,000 for grasshopper control
October 1	Mali	GRM asks for international assistance
October 2	Mali	Amb. Ryan declares disaster and donates \$25,000 to GRM/FAO program for ground and aerial reconnaissance of grasshoppers
mid-October	Mali	<u>Quelea quelea</u> bird outbreak in Niger River delta area; 380 ha. infested
October 15	Mali	Reconnaissance of bird problem begins
October 20	Mali	OFDA sent pest control specialist, Dr. Gustave Mathys, for 45-day TDY to observe field control operations, collect soil and plant samples, interpret plant residue, make recommendations regarding use of pesticides, and write a report. Cost: \$44,790
early November	Mali	EEC contributes \$125,000 for grasshopper control program
November	Mali	Grasshopper problem subsides
November-March	Sudan	Campaign mounted against locusts; Plant Protection Department consumes almost all insecticide stocks
November	Ethiopia	African migratory locust outbreaks occur in northwestern Ethiopia but are controlled

<u>Time</u>	<u>Country</u>	<u>Activity</u>
December 1	Mali	Dr. Mathys leaves
December 31	Mali Burkina Niger	OICMA and OCLALAV, West African regional pest control organizations, collapse due to lack of funds
<u>1986</u>		
March	Mali	Dr. Mathys submits report on pest problem
mid-May	Burundi	African migratory locusts begin entering the country from Tanzania; no alarming damage reported
late May	Guinea-Bissau	Possibility of grasshopper outbreak after rains in June
early June	Burkina	Canada provides technical assistance to help GOB develop grasshopper response plan
early June and taking	Sudan Ethiopia Somalia Djibouti Botswana	FAO proposes an East African locust control program to cover desert, red, ground, and migratory locusts; FAO, DLCO, RLCO, GOS, PMOSE officials, and two U.K. experts part in discussions
June 4-5	Sudan	FAO conducts donor meeting in Rome on locust situation in Sudan
June 13	Burkina	GOB calls donor meeting to request international assistance to control grasshopper outbreaks in Soum, Yatenga, Gnagna, Seno, and Kourritenga
mid-June	Burkina	Italy, the African Development Bank, FAO, Japan, and UNDP give donations of either cash or pesticides
mid-June	Tanzania	Red locust swarms in Rukwa region sprayed; 90% kill rate reported
June 18	Ethiopia	Kefa, Illubabor, Wollega, and Shoa regions report grasshopper infestations
June 18	Ethiopia	Armyworm outbreaks reported in Gamo Gofa, Sidamo, Hararge, Shoa, Wollega, and Illubabor

<u>Time</u>	<u>Country</u>	<u>Activity</u>
June 25	Sudan	Prediction of particularly severe outbreak of locusts (both African migratory and desert) for July
June 25	Sudan	Presence of migratory locusts in substantial numbers confirmed in Eastern, White Nile, and Blue Nile regions
June 25	Sudan	Amb. Horan declares disaster and requests up to \$1,000,000 for grant to EEC in response to FAO appeal
June 26	Burkina	Ambassador Neher declares disaster due to grasshoppers and donates \$25,000 for control program
early July	Mali	AFR/SWA approves funding of an experimental spray testing program, including a plane rental and the services of 3 technicians. Cost: \$90,000
early July	Botswana	FAO dispatches expert Bashir Elsadig to Botswana for one year to help GOB organize control program and provide in-country training
July 7	Africa/ Sudan	FAO convenes donors' meeting on migratory locusts; EEC, USG, China, Finland, France, Greece, Spain, and Sweden all announced contributions of either cash or pesticides for locust control in East Africa
mid-July	Chad	FAO entomologist spots both desert and African migratory locusts in Bol area near Lake Chad; reports of grasshopper infestations come from all Sahelian prefectures
mid-July	Ethiopia	Desert locust infestation (in the hopper stage) reported in Red Sea coastal area of Eritrea near Sudanese border
mid-July	Ethiopia	FAO rep, Dr. Loerbroks, stationed in Addis; U.K., EEC, FAO, and DLCO all involved in locust control
July 14	Ivory Coast	Locusts or grasshoppers currently pose no threat to Ivory Coast
July 18	Zaire	No current significant threat of locusts or grasshoppers

<u>Time</u>	<u>Country</u>	<u>Activity</u>
July 18	Lesotho	No current significant threat of locusts or grasshoppers
July 18	S. Africa	A large outbreak of locusts is anticipated in 1986-87 summer season; numberable egg beds are expected to produce the largest plague in recent times
July 20	Sudan	Netherlands donates \$1,000,000 to FAO/EEC control program
July 21	Zambia	No current significant threat of locusts or grasshoppers
July 21	Mali	Grasshoppers affect Regions I and II and significant crop damage is expected
July 22	Madagascar	No locust problem reported
July 23	Chad	Situation worsens and locust infestation in Lake Chad area becomes emergency
July 24	Ethiopia	Chargé James Cheek declares disaster
July 25	Sudan	OFDA executes grant of \$1,000,000 to EEC for locust control
July 25	Ethiopia	OFDA obligates \$75,000 through FAO for helicopter surveys of African migratory and desert locust outbreaks
July 25	Chad	Amb. John Blane declares disaster and requests \$725,000 for aerial spraying of 200,000 ha. as part of FAO's locust control program
late July	Senegal	Entire northern region invaded by grasshoppers; great concern over potential damage
late July	Senegal	FAO, African Development Bank, France, and Italy provide cash and pesticides for grasshopper outbreak; FAO also provides 3 experts and training

<u>Time</u>	<u>Country</u>	<u>Activity</u>
July 28	Tanzania	Red locusts reappear in Rukwa and Tabora regions; FAO requests insecticide from Nairobi and believes situation will be under control for balance of 1986
July 29	Sudan	PSC sent out from U.S. Mission to several locust stations to give the senior official of the GOS Plant Protection Department sufficient funding for 10 days' work. Cost paid from local counterpart funds
July 29	Swaziland	Locusts currently not a problem, but there is concern about infestation from South Africa
July 29	Burkina	Grasshoppers affect a widespread area of northern Burkina but have not caused major crop damage due to effective GOB control efforts
July 29	Chad	AFR/SWA provides \$50,000 for grant to FAO to purchase pesticides in Nigeria and Cameroon
July 29	Togo	Locusts or grasshoppers currently pose no threat to Togo
July 30	Ethiopia	Both desert locusts and grasshoppers sighted in Eritrea; locusts reported but not confirmed in Tigray
July 31	Botswana	Locust situation currently calm, but millions of eggs are awaiting change in temperature and moisture to hatch, possibly in late August
August 1	Sudan	Two AID/W personnel (Kate Farnsworth and Jerry Rann) arrive in Rome to meet with FAO locust staff
August 1	Uganda	No locusts sighted yet, but situation is being watched
August 1	Africa	A.I.D. Administrator M. Peter McPherson is appointed by President Reagan to direct the U.S. assistance effort by combatting locust and grasshopper outbreaks in Africa

<u>Time</u>	<u>Country</u>	<u>Activity</u>
August 1	Mali	A massive hatching of grasshoppers (<u>Oedalus senegalensis</u>) has occurred across the Sahel Zone; African migratory locusts are reported in Niger River delta area east of Mopti
August 1	Cape Verde	Locusts and grasshoppers currently pose no threat
August 1	Gambia	High infestation of grasshoppers and locusts reported in the eastern half of the country
August 4	Sahel	OFDA Logistics Officer (Bob Keesecker) meets with FAO locust staff
August 4	Niger	Localized grasshopper outbreaks occurred in Niamey, Dosso, and Diffa departments in July; grasshoppers being treated and situation is under control
August 5	Mali	Amb. Ryan declares a disaster due to the intense infestation of grasshoppers
August 5	Mauritania	The Mauritanian government and donors begin to fight grasshopper infestation in the south; however, pest infestation is currently not as bad as last year's
August 6	Africa	The FAO opens the Emergency Center for Locust Operations (ECLLO) under the leadership of Lukas Brader; reports raising \$12 million for locust control in West Africa and \$6 million for other parts of Africa
August 6	Botswana	The GOB has called for a \$1.2 million control program, comprising sprayers, communications, air services, and pesticides; this request has been relayed to FAO
August 8	Chad	USAID/Ndjamena picks up 1,500 liters of fenitrothion from OICMA in Cameroon
August 8	Chad	ODFA executes grant of \$725,000 for FAO aerial spraying program
August 8	Chad	Africare rep reports that grasshopper infestation in Abeche (eastern Chad) resulted in heavy damage to young millet crop

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<u>Time</u>	<u>Country</u>	<u>Activity</u>
August 8	Mali	U.S. Mission/Bamako reports need for 15 airplanes
August 8	Senegal	Hatching has proliferated along the Senegal River with infestations up to 300/sq. m.
August 8	Swaziland	Unconfirmed reports of swarms from Mozambique entering the country
August 9	Tanzania	U.S. Mission requests \$50,000 from OFDA to repair aircraft for red locust control; without these aircraft, swarms could regroup
August 10	Chad	OFDA dispatches a team for 2-3 weeks to survey conditions in Chad and develop a plan of action; the team includes an entomologist, operations specialist, logistics specialist, communications specialist, and OFDA team leader (Christine Babcock)
August 10	Chad	AFR/SWA dispatches an entomologist for a 3-day TDY
August 11	Mali/ Mauritania	OFDA dispatches a team for 2-3 weeks to survey conditions in Mali and southern Mauritania and develop a plan of action; the team includes 2 entomologists, an operations specialist, a logistics specialist, and OFDA team leader
August 11	Zaire	Locusts have come to northeastern Zaire in four waves: in May, the end of June, the beginning of July, and in August.
August 11	Zaire	The GOZ Prime Minister asked the U.S., Britain, France, Belgium, West Germany, and Italy to fight the locust plague
August 11	Liberia	Liberia is not affected by grasshoppers or locusts and probably will not be
August 11	Djibouti	Desert locusts are present and DLCO is keeping a close watch on the situation
August 12	Ethiopia	Desert locusts are confirmed in Eritrea (north, west, and northwest of Massawa); Tigray has a significant infestation of tree locusts and grasshoppers; the latter are also reported in western Gonder

<u>Time</u>	<u>Country</u>	<u>Activity</u>
August 12	Ethiopia	Switzerland and EEC contribute fenitrothion; Canada provides \$75,000 for air surveillance
August 12	Chad	Severe damage requiring replanting due to grasshopper infestation has occurred in Chari Baguirmi and Ouaddai prefectures
August 12	Chad	FAO entomologist warns that inadequate control before the end of September will result in migration of the locusts; to date most of the damage is above 12° north
August 12	Ethiopia	The MOA Chief for Eritrea describes the armyworm outbreak as the worst in 40 years
August 12	Cameroon	No locust or grasshoppers outbreaks currently, but situation is being watched for potential invasion from Mali
August 13	Tanzania	U.S. Chargé Joseph Segars declares a disaster and requests that OFDA provide \$50,000 to contract 60 hours of helicopter time and for Cessna repair
August 13	Ethiopia	The desert locust situation in Eritrea has reached the point where only aerial spraying can contain the swarms
August 13	Ethiopia	The general direction of the desert locust movement appears to be from eastern and northern Eritrea to southern and western parts of the province
August 13	Ethiopia	The ERA issues an appeal to the international community for assistance in the control of desert locusts in Eritrea
August 13	Guinea	No reports of locusts
August 13	FAO/Rome	ECLO Chief Brader reiterates that FAO will not purchase pesticides unacceptable to A.I.D. such as BHC or dieldrin, and will advise governments against their use
August 13	FAO/Rome	Lukas Brader has been given extraordinary emergency procurement authority and can bypass regular FAO procedures
August 13	FAO/Rome	ECLO requests \$2 million for a standby reserve from UNDRO

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<u>Time</u>	<u>Country</u>	<u>Activity</u>
August 13	Senegal	GOS holds a donor coordination meeting and requests assistance
August 14	Zaire	USAID/Kinshasa requests an OPDA team to do an assessment of the locust situation
August 14	Zambia	IRLCO-CSA reports a rapid buildup of red locusts and African migratory locusts in the Kafue flats (about 100 miles west of Lusaka); red locusts are also building up very fast around Lake Mweru Wantipa in northern Zambia
August 14	Malawi	Locusts are building up in the Lake Chiwa flood plain
August 14	Mozambique	Situation is unclear, but Mozambique radio has reported that heavy swarms have been moving north and northwestward towards Malawi, Zambia, and Zimbabwe
August 14	Tunisia	Slight grasshopper infestations reported
August 14	Oman	Partly gregarious desert locusts reported, probably escapes from spring breeding in Saudi Arabia
August 14	Lesotho	There is "considerable concern" over the brown locust; FAO expects a request of assistance
August 14	S. Africa	There are reports that the brown locust situation is very bad and could spread to neighboring countries
August 15	Senegal	U.S. Ambassador Lannon Walker declares a disaster; 1,000,000 ha. currently infested or risk imminent infestation (this represents 42% of Senegal's arable land)
August 15	Botswana	U.S. Ambassador Natale Bellocchi declares a disaster and OPDA sends \$25,000 Ambassador's Authority; the GOB is also requesting radio equipment, sprayers, pesticides, and vehicles for a total of \$499,000

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<u>Time</u>	<u>Country</u>	<u>Activity</u>
August 15	Zambia	The GRZ MOA establishes a task force to assess the needs to fight locusts; USAID is on the task force
August 17	Zambia	U.S. Chargé H. Kenneth Hill declares a disaster due to the infestation of red locusts, which have been identified in two places: the Kafue flats and Northern Province; OPDA provides \$100,000 for fuel and other operating expenses of GRZ helicopters deployed to pinpoint the exact location of the locusts (money is presented by A.I.D. Administrator M. Peter McPherson); if spraying does not begin in September, the situation will be even worse next year
August 18	Sudan	The locusts that have been identified in the Gedaref area are in a relatively advanced stage with densities characterized as medium to heavy
August 18	Sudan	The EEC/USAID-purchased pesticides have not arrived in Sudan yet, nor have the 2 FAO advisors; both are sorely needed soon
August 18	Mali	An estimated 7,000 sq. km. needs to be sprayed; spraying should begin in late August and last about 3 weeks
August 18	Malawi	Red locust situation currently "calm"; however, President Banda has placed a high priority on monitoring the locust situation and the GOM has launched a national red locust alert campaign
August 18	Malawi	The recognized breeding areas for the red locust are the Kuselikumvenji Estate in Phalulu area, the Lake Chilwa Plain, and the Elephant and Ndidid marshes in the Shire Valley
August 18	Malawi	Greater damage than "native" locusts is the possibility of invasion of swarms from Tanzania, Zambia, and Mozambique

<u>Time</u>	<u>Country</u>	<u>Activity</u>
August 19	FAO/Rome	ECLO donor meeting scheduled; Netherlands, Sweden, West Germany, U.S., France, Italy, Japan, Finland, Norway, China, EEC, Great Britain, Denmark, and Canada are invited; Julia Taft and Don Reilly represent A.I.D.
August 19	Sahel	ECLO donor meeting devised \$3.8 million Sahel plan of action
August 19	Senegal	OPDA 6-member team of experts arrives in Dakar (led by Bob Thibeault)
August 19	Ethiopia	Donors' meeting postponed indefinitely
August 19	Ethiopia	DLCO has done aerial spraying of 2,400 km. along the Red Sea coast using 1,000 liters fenitrothion and 1,600 liters dieldrin from its stocks; this area is now considered under control
August 19	Ethiopia	Locust situation in Tigray is much more difficult to assess and control
August 19	Sudan	FAO experts Schnabel and Awad arrive
August 20	Guinea-Bissau	FAO rep reports infestations in Cacheu, Oio, Bolama Bijagos, and Bissau zones
August 20	Mauritania	Following good rains in late July and early August there was massive hatching in southeastern and central southern Mauritania with densities up to 150/sq. m.; ground control is in progress with strong participation of farmers
August 21	Gambia	The Western Division is now the most seriously threatened area by grasshoppers and hairy caterpillars; other infested areas include the Lower River Division and the North Bank and McCarthy Island Division
August 21	Egypt	GOE officials feel that desert locusts may pose a problem as early as October, but to date none have been spotted
August 21	Cameroon	FAO/Cameroon is concerned about a possible substantial invasion of locusts and grasshoppers in the northern three provinces from Chad in October

<u>Time</u>	<u>Country</u>	<u>Activity</u>
August 22	Chad	OFDA team requests the procurement of small items (e.g., goggles, nozzles)
August 22	Botswana	A.I.D. sends a grant of \$475,000 to FAO
August 22	Ethiopia	DLCO/EA believes that locust situation in Ethiopia is currently not serious
August 22	Botswana	Botswana Defense Force (BDF) helicopters reports large swarms of locusts north of Gaborone in the central district, Shoshong Region; BDF sent control teams for spraying
August 22	Botswana	Botswana agricultural officers in the southern district between Konkong and Khakhea sited gregarious hoppers moving towards the northeast; control teams have begun spraying
August 22	Mozambique	FAO knows there is a locust problem in Mozambique, but has no information on its magnitude
August 22	Mali	Donors' meeting in Bamako
August 22	Mali	Dry weather in late July and early August slowed down the buildup of grasshoppers in northern Mali; counts of grasshoppers south of Gao to the Niger border and across a band in southeastern Mauritania range from 5 to 30/sq. m.
August 22	Mali	Of greater concern is that whenever it rains, significant hatchings of grasshoppers appear soon after; recent improvements in rainfall in 3rd generation breeding grounds causes concern that a major threat still exists
August 22	Mali	The GRM will use USG-generated local currency to pay for an intensive helicopter survey around 16° latitude; this survey will start August 26
August 22	Chad	The Abeché and central Mongo areas do not currently have migratory locust problems

<u>Time</u>	<u>Country</u>	<u>Activity</u>
August 22	Chad	OFDA team confirms presence of migratory locusts in the Lake Chad basin in building numbers; however, current numbers are less than previously reported
August 22	Burkina	Consensus develops that Burkina will face a severe grasshopper threat in September and October which will exceed the capacity of the GOB to control; current GOB figure is 200,000 ha. at risk from a major outbreak
August 22	Burkina	GOB plans to establish a special structure for grasshopper control activities; this will be a ministerial-level committee; a smaller working group, comprising reps from Agriculture, Interior, Defense, and Family Welfare, will be responsible for day-to-day operations
August 22	Senegal	OFDA recommends that the USG provide 4 DC-7s with 3,000-gal. tank pesticide capacity for a spraying campaign to begin the first week of September (estimated cost is \$1.4 million)
August 22	Senegal	Heavy infestation of African migratory locusts covers an estimated 200,000 ha. in northeastern Senegal bounded roughly by Matam eastward to Bakel in a band about 10 km. wide, the number of locusts averaging 70/sq. m.
August 22	Senegal	Moderate infestation has been noted in 160,000 ha. in the area between Louga and Linguerne in northern Senegal
August 22	Burkina	GOB PPS reports that 15,397 ha. have been treated using about 200 MT of insecticides (propoxur and fenitrothion mixture); kill rates averaged 80%-90% for grasshoppers in the larva state; treatment was with dusting bags and backpack sprayers; PPS believes this treatment program has been largely successful

<u>Time</u>	<u>Country</u>	<u>Activity</u>
August 22	Mali	OFDA purchased 50,000 l. fenitrothion from a vendor in Texas for \$5.20/liter; pesticide will be shipped to Bamako to arrive before September 1
August 22	Chad	Grasshopper situation in Abeché and Guera is "calm"; in Ouaddai, grasshopper population is higher than in normal years
August 22	Chad	OFDA team recommends immediate aerial spraying against locusts in the Lake Chad area; ground application of powdered insecticide is recommended for grasshopper control in the eastern, central, and western areas
August 22	Chad	USAID/Ndjamena requests that Carl Castleton, AFR/SWA-financed entomologist, be extended beyond his 30-day TDY until October 31
August 22	Mali	USG testing program restarts August 28 for 6 days; spray aircraft will test malathion, carbaryl, fenitrothion 10%, fenitrothion 96% diluted to 50% with vegoil, chlorpyrifos, and cypermethrin; OFDA team will supervise spraying
August 22	Mali	CPS has divided infested areas into four zones: 1) Kayes, Yelimane, Nioro; 2) Balle, Narn Moudiah; 3) Niafunke, Adrar; and 4) Mopti, Rharous; the first 3 zones contain about 100,000 ha. each to be treated, and Zone 4 contains 90,000 ha.
August 23	Mali	OFDA provides \$240,000 for a joint U.S/French helicopter spraying operation; the GOF will deploy 2 commercial spray helicopters, 2 support trucks, and crew from Ivory Coast, and will provide a coordinator (Mr. Caudron); OFDA money will buy 200 hours of flying time, per diem for flight crews, fuel, and support services

<u>Time</u>	<u>Country</u>	<u>Activity</u>
August 25	Djibouti	The MOA, in conjunction with FAO and DLCO/EA, undertook an aerial eradication campaign the week of August 11; 700 sq. km. were covered using 2,100 liters of pesticides; 95% of the infestation was reportedly eradicated
August 25	Mali	Rainfall through August and September will determine the magnitude of the problem, though there is growing reason to believe that a worst-case scenario of grasshopper infestations may well develop
August 25	Mali	As a result of recent rains, two 40-sq.-km. areas, one southwest of Nara and the other north of Niore, have registered hatchings and young hopper infestations of roughly 50/sq. m.; in places they are already exhibiting gregarious behavior
August 26	Ethiopia	ERA reports that locust infestations are spreading rapidly throughout southern and eastern Eritrea; problem is beyond its control
August 26	Gambia	Ground surveys reveal low-level grasshopper populations in wild vegetation in Western Division and in rice in North Bank Division
August 27	Mali	USAID/Bamako will take care of spraying the Balle-Nara area and will contract 3 spray planes
August 27	Senegal	FAO/Rome rejects large-plane program for Senegal; OPDA cancels DC-7 plans
August 27	Mauritania	Few insects were noted during June and July, but with the increased rains in August, hatching was noticed west of Touil and south of Kobenni; ground control units were able to eradicate most of the pests
August 27	Sudan	Heavy grasshopper infestation has been noted in the Sahel zone in Rora and in the southeastern zone around Baada

<u>Time</u>	<u>Country</u>	<u>Activity</u>
August 27	Chad	OFDA team noted that the locust problem is localized around Bol and is not general to the Lake Chad area
August 27	Burkina	If the grasshopper situation becomes serious, it will become evident in the next four weeks
August 27	Burkina	GOB response plan calls for 100,000 ha. to be treated by ground operations and 100,000 ha. from the air
August 27	Burkina	If an aerial operation does become necessary, additional technical assistance will be required for the duration of the campaign; the GOB has no experience in aerial spraying
August 27	Chad	OFDA team estimates that the total area to be treated around Bol is estimated at 4,000 ha.; spray airplane is due to arrive September 1
August 27	Chad	It is still likely that Chad will face a serious threat from grasshoppers in mid-September to late October
August 28	Senegal	GOB calls A/AID McPherson to press for the U.S. large-plane aerial spray campaign; OFDA agrees and starts putting it together
August 28	Burkina	The two major areas of probable grasshopper outbreaks are along the Mali border north of Ouahigouya (80,000 ha.) and along the Niger border northeast of Dori (70,000 ha.)
August 28	Burkina	USAID/Ouagadougou draws up a contingency operations plan for aerial spraying, calling for 2 aircraft in addition to the 2 already provided by Canada; program is being discussed with GOB, FAO, and other donors; USAID requests AID/W input

<u>Time</u>	<u>Country</u>	<u>Activity</u>
August 29	DLCO/EA	REDSO/EA asserts that it is cost-effective to have a regional organization such as DLCO/EA; DLCO has requested \$1.745 million for pesticides, equipment, and other items; REDSO believes that OPDA assistance is justified for all categories of the request
August 29	Morocco	Morocco has not had a serious locust infestation in 20 years, but due to the large locust population currently in the Sahel, the GOM is concerned that a severe attack of locusts could occur this year
August 29	Kenya	There have been no reports of significant locust or grasshopper swarms developing
August 30	Mali	25,000 liters of the fenitrothion purchased by OPDA arrives in Bamako
August 30	Zaire	OPDA 4-person team arrives for assessment visit (led by Alan Swan)
August 30	DLCO/EA	OPDA agrees that DLCO's requests are reasonable, but suggests that they should be channeled through FAO so that shoring up DLCO and like organizations can be a multi-donor effort
August 30	Botswana	Gaborone was "surprised" by a small swarm of brown locusts in the migratory phase, recently prodded to action by rise in temperature; winds came from north and northeast, so locusts did not come from South Africa
August 31	Senegal	Planes (4 DC-7s) and crew arrive in Dakar for large-plane aerial spray campaign
August 31	Sudan	Desert locusts are a growing problem in Kassala region; the situation is exacerbated by the proximity of the Ethiopian border; control activities can only take place in mid-morning and afternoon due to gunfire between Ethiopian government and rebels
August 31	Sudan	African migratory locusts are reported to be hatching over a large area in Damazine

<u>Time</u>	<u>Country</u>	<u>Activity</u>
August 31	Sudan	Large infestations of grasshoppers have been reported in parts of South Kordofan, North Darfur, and Gederef
August 31	Sudan	A.I.D.-financed equipment is due to begin arriving September 2 by Boeing 707 charter; there will be 4 planes in all: 2 on September 2, 1 on September 3, and 1 on September 4
August 31	Senegal	3 teams of USAID/GOS/FAO reps criss-crossed Louga-Linguere and found the area of grasshopper/locust infestation to be much larger than 160,000 ha.; heavy counts of mature adults found along southern rim of infested area, threatening peanut basin
August 31	Tanzania	First meeting of Locust Control Steering Committee held; chaired by FAO; attended by USAID, UNDP, UNICEF, MOA, Prime Minister's Office, Canada (CIDA), Denmark (DANIDA), and West Germany (GTZ)
September 1	Senegal	772 drums of malathion arrive in Dakar
September 2	Guinea-Bissau	Population densities of grasshoppers are now about 30/sq. m. and most are in the 3rd instar nymph stage; sightings are in Regions I and II to the north and northeast of Bissau
September 3	Yemen	There is not currently a locust or grasshopper problem in Yemen; however, the possibility exists of one during November or December
September 3	Mali	Remaining 25,000 liters of OPDA-purchased fenitrothion arrives in Bamako
September 3	Mali	USAID completes program of pesticide testing
September 3	Senegal	135 drums of malathion arrive in Dakar
September 4	Senegal	130 drums of malathion arrive in Dakar
September 4	Senegal	Spraying delayed
September 4	Chad	OPDA team's detailed operations plan was well-received by the GOC and FAO

<u>Time</u>	<u>Country</u>	<u>Activity</u>
September 5	S. Africa	There have been no hatchings of brown locusts reported; on August 29 a small swarm came into the country from Botswana but with the change in wind direction, the swarm went back
September 5	Cameroon	There is a possibility of a substantial invasion in northern Cameroon from the north by locusts and grasshoppers; plan of action has been prepared by FAO regional plant protection officer
September 5	Niger	If rains do not stop by mid-month, Niger is facing potentially massive outbreaks
September 5	Chad	USAID is covering costs of helicopter rental and services under \$906,000 grant to FAO/ECLC
September 6	Burkina	The best available information indicates the actual area at risk from grasshoppers may be as large as 400,000 ha.; a total of 50,000 ha. is under a severe and immediate threat and extends from the Nou Noun (Black Volta) across the north to the Niger border; an additional 150,000 ha. to 250,000 ha. south of this zone as far as Ouagadougou could also face significant grasshopper damage if control efforts in the north are not effective
September 6	Burkina	USAID/Burkina, FAO, and the GOB have developed a three-pronged program, using large and small aircraft and ground treatment
September 6	Burkina	USAID/Burkina requests from AID/W 2 large multi-engine (Class A) aircraft for 10-15 days of spraying operations in northern Burkina beginning around September 16; these aircraft will be used to reduce grasshopper populations over large, very rural areas; this operation will spray 150,000 ha. and will require 216,000 liters of carbaryl
September 6	Senegal	Spraying program using 4 large planes begins; all but one plane is in operation

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<u>Time</u>	<u>Country</u>	<u>Activity</u>
September 6	Burkina	The small-airplane operation will use 1 French and 2 Canadian planes and will cover locations within the large-plane treatment zones excluded from treatment due to environmental or logistics considerations; these aircraft could cover a total of up to 35,000 ha. in 5 weeks
September 6	Mali	A GRM army helicopter began a survey of northern Mali; preliminary findings are low densities of 5/sq. m. between Douentza and Gao, and of 5-10/sq. m. from south of Ansongo up to Bourem
September 7	Niger	There continue to be scattered outbreaks of <u>Oedalus senegalensis</u> ; Niamey department is one of the hardest hit; grasshopper attacks have also increased in Tahoua department; there is a strong possibility of serious, perhaps massive outbreaks in southern Niamey and in Dosso departments
September 7	Niger	Both ground and aerial treatments have been carried out
September 8	DLCO/EA	DLCO/EA agrees to submit its \$1.7-million request to FAO
September 8	Guinea-Bissau	OPDA grant to FAO for Guinea-Bissau has been used to purchase 32 back sprayers from West Germany; the sprayers are due to arrive September 12
September 8	Sudan	The main areas of locust activity continue to be Kassala and Damazine, with Kassala more seriously affected
September 8	Sudan	During the week of September 1, 4 Boeing 707s delivered 95% of the USAID/BEC-financed equipment and pesticides; included are pick-ups, station wagons, camping gear, generators, and pesticides; Bedford load carriers and radio sets due to arrive in October
September 8	Sudan	The general feeling at the moment is that donors have responded in time to assist Sudan in averting any major locust outbreak which may occur

<u>Time</u>	<u>Country</u>	<u>Activity</u>
September 8	Mali	Aerial treatment by USAID began on August 30 between intervals of testing pesticides
September 8	Mali	USAID will intervene in the Balle-Wara-Mourdiah Zone No. 2 and in southeastern Mauritania; USAID, CPS, and the French share the principle of moving resources to where the problem is most serious
September 8	Tanzania	MOA and FAO reported some crop destruction by grasshoppers in Tanga and Morogoro regions
September 8	Burkina	Burkina has a severe scarcity of 55-gal. drums for use in transporting fuel
September 9	Guinea	The GOG is worried that when the locusts swarm in Guinea-Bissau, they may head to Guinea
September 9	Guinea	The capability of the GOG to meet any locust/grasshopper infestations is minimal
September 9	Botswana	Small swarms of gregarious brown locusts reported in the southern area up to the Tuli block on the east and Shoshong on the west; these swarms, however, do not currently constitute an important problem
September 9	Botswana	FAO locust control experts report that with a continuing rise in the daily temperature and some anticipated moisture, widespread hatching will occur during the second half of September, hopper bands will form in October and November, and swarms will form in late November and December
September 9	Botswana	The MOA, FAO, SARCCUS, IRLCO, and DLCO are conducting a 2-week practical training workshop for the field supervisors of the newly formed Botswana locust control teams and regional ag. extension officers (about 50 participants in all)
September 9	Chad	FAO bought the services of a helicopter with A.I.D. grant money; however, this helicopter will be insufficient to cover the necessary ground; FAO/Chad recommends to FAO/Rome that a fixed-wing aircraft be contracted

<u>Time</u>	<u>Country</u>	<u>Activity</u>
September 9	Chad	115 MT of chemicals and 21 MT of equipment have been prepositioned in 7 prefectures
September 9	Mauritania	Aerial spraying will soon start west of the Kiffa-Kinkossa line
September 10	Botswana	FAO is reported to be doing a superb job in coordinating efforts between MOA and donors; FAO expert (Bashir Elsadig) has been invaluable
September 10	IRLCO	The IRLCO-CSA has estimated the value of its immediate needs at \$843,097, of which \$441,897 has been provided or pledged; its intermediate needs at \$1,152,421; and its long-term needs at \$333,301
September 10	Chad	Significant crop destruction is occurring or has occurred in Abeché, Ouaddai, and Batha
September 10	Senegal	Spraying of 231,000 ha. in the Louga-Linguere area is completed
September 10	Cameroon	UNDP/FAO calls donor meeting; GRC presents informal request for immediate assistance for aerial survey/treatment equipment
September 10	Chad	FAO charters fixed-wing aircraft from Cameroon, financed by Sweden, for Chad
September 11	Ethiopia	Dr. Schaeffers, entomologist on TDY in Sudan, and John Gaudet, REDSO/EA, arrive to assess the situation for 2 days
September 11	Senegal	An operational cell, comprising reps from CPS, FAO, Canada, OCLALAV, France, and USAID/Dakar, has been established to develop a detailed plan of action for Phase II
September 12	Ethiopia	ERA reports that of a total area of 726,400 ha. at risk from locust infestation, 20%-25% (145,280 ha.) will be infested at any one time

<u>Time</u>	<u>Country</u>	<u>Activity</u>
September 12	Senegal	Spraying of 135,000 ha. in Bakel area begins
September 12	Cameroon	USAID/Yaoundé requests crop protection expert and airplane parts
September 12	Gambia	Steering committee, chaired by FAO, is established to monitor the grasshopper threat and coordinate control efforts
September 12	Botswana	Donor meeting estimates external financial requirements of 1986-87 locust campaign at \$2.3 million
September 12	Rome	DLCC meeting ended; U.S. delegation brought attention to: increased use of dieldrin, development and deployment of remote sensing, increased need for training, and field testing of predictive modeling
September 13	Senegal	Spraying of Bakel area completed; total hectarage sprayed in this area came to 141,000
September 13	Burkina	OFDA/AFR Director Tim Knight, Logistician Bob Adams, and Operations Specialist Lynn Thomas arrive in Ouagadougou to discuss big-plane option; it is decided to go ahead with helicopter survey instead; approximate cost is \$80,000
September 14	Chad	Spray helicopter and OFDA-procured support equipment arrive; however, 3 spray aircraft from Cameroon desperately needed ASAP
September 15	Senegal	USAID/Dakar requests \$1.7 million to extend DC-7 spraying to another 300,000 ha.; total known infested area has risen to 1.1 million ha.; priority area for additional spraying is Louga-Linguere
September 15	Burkina	Small-plane operation due to begin
September 17	Chad	Helicopter to begin spraying in Lake Chad area

<u>Time</u>	<u>Country</u>	<u>Activity</u>
September 17	Burkina	Proposed helicopter use would include flight time for prospecting, marking of spray blocks, and follow-up mortality surveys
September 17	Mozambique	The current locust situation does not appear to be serious; MOA reps visited traditional locust breeding area of Buzi and Sofala and found count of 2/sq. m.; the other known locust breeding ground is on the eastern border with Malawi (the lake/swamp area between Milange and Mecanhelas) but is too insecure to be investigated
September 17	Mozambique	The MOA formed a special committee for the locust prevention and control program
September 19	Ethiopia	The Schaeffers and Gaudet team concludes that there is no locust crisis at present, though greater efforts must be made to collect data from remote and non-government controlled areas
September 19	Gambia	Significant levels of infestation have now been reported in North Bank Division and the northern areas of McCarthy Island Division; while not as bad as in Western Division, infestations in these areas are spreading
September 19	Botswana	USAID/Gaborone requests an additional \$874,400 for 56,200 liters fenitrothion, 200 hours flying time, and a mobile command center
September 19	Zaire	OFDA team did not find pest infestation in Haut-Zaire; grasshoppers are a common problem in the area and last October and November saw a particularly severe attack, but this year appears calm
September 19	Chad	Visits to the field concluded that the Sudanian zone is not experiencing an unusual level of grasshopper activity, with one notable exception near Koumra, and that FAO efforts at organizing ground control treatment of infested zones further north have been hampered by lack of donor funding for operating expenses for ground control program

<u>Time</u>	<u>Country</u>	<u>Activity</u>
September 22	Niger	Severe attacks of grasshoppers have been reported in Niger, and locust swarms may be headed toward it from Lake Chad; the GON has requested urgent assistance
September 23	Sudan	All pesticides, vehicles, and equipment which have arrived so far have been sent to the field; control operations are taking place in Kassala (in the east), Sennar (in the center), and south Kordofan
September 23	Botswana	The following items have been ordered with OFDA's \$494,000 grant to FAO: 16,000 liters fenitrothion 96% ULV, 12 SSB-HF transceivers (10 mobile and 20 base), 20 ULV Hudson portapack sprayers, and 5 ULV locust sprayers; also, 200 flying hours for surveying and 200 spraying hours will be bought
September 23	Botswana	The GOB submitted an official request for additional assistance; this includes radios and base stations, 56,200 liters fenitrothion, flying time, and a mobile command center
September 24	Botswana	OFDA agrees to provide an additional \$564,587 to FAO and \$100,000 to the GOB for the control program
September 24	Burkina	OFDA provides \$120,000 for the French Allouette II helicopter
September 24	Cameroon	OFDA agrees to provide \$200,000 for airplane spare parts
September 25	Chad	OFDA's grant to the FAO was used to pay for aerial spraying time, operating expenses, pesticides, 2 sprayers, 4 radios, 2 ground support units, and personnel support
September 26	Gambia	The Steering Committee concluded that the grasshopper situation should now be treated as an emergency and that aerial spraying of 102,000 ha. should take place soon

<u>Time</u>	<u>Country</u>	<u>Activity</u>
September 26	Zimbabwe	Though there are currently no locusts in Zimbabwe, the GOZ Minag has submitted a request to solicit donor support for a national locust control program based on the assumption that one or more of its neighbors will not be able to control their locusts
September 26	Senegal	There may be 920,000 ha. infested; small-plane operation has so far had only 30%-40% effectiveness; this Phase II operation began September 20
September 26	Nigeria	Authorities in the state of Kano noticed in mid-September an unusually heavy grasshopper infestation moving from the northeast border; state officials are trying to control this by ground methods
September 26	Chad	Grasshopper infestation of the millet crop in Abeché continues to be serious problem; range is from 5-20/sq. m.; officials in Abeché report that 4,600 ha. are in urgent need of aerial spraying
September 26	Chad	Entomologist Carl Castleton reports no confirmed sightings of locust swarms (either migratory or desert) in Chad within last 2 months despite intensive survey throughout Sahelian zone; adult specimens of each species have been captured but they have all been in the solitary rather than the gregarious phase; aerial program began September 17 with top priority given to areas like Bol where solitary phase, non-swarmling populations of African migratory locusts exceeded 1,000/ha
September 26	Chad	Planes from Cameroon finally arrive
September 27	Chad	Because planes from Cameroon have been delayed so long, Dr. Brader has been asked to dispatch a plane from Europe
September 27	Mauritania	USAID/Nouakchott declares that a disaster situation exists in Mauritania; the Ambassador will use his \$25,000 for fuel and oil for the fixed-wing planes which will spray in the Mali border area

<u>Time</u>	<u>Country</u>	<u>Activity</u>
September 29	Zambia	Aerial survey and spraying operations began on September 15
September 30	Mali	Because of strong donor support, OFDA is prepared to assure that the four DC-7s in Senegal will be available for use in Mali and Mauritania; OFDA is prepared to fund one-third of the total large-plane operation if donors and host governments provide the rest
September 30	Niger	At the weekly meeting, donors decide to approve the GON request for up to 3 more additional small planes
October 1	Mali	OFDA agrees to provide \$104,000 to the U.S. Mission to extend the 2 French planes for up to one month
October 1	Chad	U.S. Mission has requested \$60,000 to pay for 20 additional hours for helicopter flying time
October 1	Mauritania	USAID/Nouakchott requests \$170,000 to buy 60,000 liters of fuel and 1,600 liters of oil for the 2 Grumman Agcats (Algerian planes), 20,000 liters of malathion, and the services of WPRO personnel and vehicle
October 2	Mali	As of September 26, a total of 190,000 ha. had been treated using small aircraft; of this total, 72,000 ha. was in the USG zone of intervention and 26,000 in southeastern Mauritania; the total amount of pesticides used so far has been 79,000 liters of fenitrothion 50% and 8,400 liters fenitrothion 96%
October 2	Mali	Current estimates are that Mali must have additional means to treat another 200,000 ha.; it is not feasible to treat all of this area with small aircraft, so USAID/Bamako requests \$104,000 to extend the 2 small French planes for up to a month, 60,000 liters malathion, and use of the large planes now in Dakar; other donors are expected to pay two-thirds of the large-plane operation

<u>Time</u>	<u>Country</u>	<u>Activity</u>
October 2	Senegal	The grasshopper situation is worsening; the GOS and donors reach consensus on the need for additional DC-7 spraying in the Louga area and additional small-plane spraying in Casamance; OPDA provides \$226,000 for the plane operation and acts as purchasing agent for 184,000 liters malathion
October 2	Senegal	During the past 20 days, abundant rains in Louga-Linguere have spawned a second generation of nymphs in densities of over 200/sq. m. in blocs already treated in Phase I and up to 1,000/sq. m. in untreated areas; estimated area infested (more than 20/sq. m.) in Louga-Linguere totals 650,000 ha.
October 3	Mali	Mali expects to have a surplus of cereals available from the harvests of last year and this year and from other donor contributions
October 3	Burundi	No grasshoppers or locusts are reported to be in Burundi at this time
October 3	Niger	GON flip-flops on extent of infestation; GON will probably not use \$150,000 made available through OPDA's grant to FAO
October 7	Chad	To date, over 22,000 ha. have been sprayed in Lac, Kanem, and Chari-Baguirmi prefectures during 103 hours of flight time using the Bell helicopter; kill rate of grasshoppers has been 80%-90%; reinforcement of aerial control program using fixed-wing aircraft from Cameroon was delayed for 2 weeks due to contractual problems; ground control efforts have been ineffective due to lack of logistical support and insufficient training; these delays have resulted in massive buildups of young adult grasshoppers in the Sahelian zone; impact on crop production has yet to be determined; the GOC and donor community have begun planning for next year's campaign

<u>Time</u>	<u>Country</u>	<u>Activity</u>
October 7	Senegal	An environmental assessment team departs for Senegal to conduct pesticide efficacy testing
October 7	Chad	Grasshoppers have invaded the capital city of Ndjamea; the insects flying around streetlights resemble effects of a major snowstorm and streets are covered with grasshopper carcasses
October 7	Chad	The GOC began spraying the locusts in Ndjamea on October 6 using the French helicopter; several expatriate technicians, including the FAO entomologist and the Shell rep, supported the GOC plan, while Carl Castleton, the USG entomologist, objected to it on several grounds such as possible intoxication, no existing biological justification (i.e., no crops will be lost), and that it is a waste of precious resources
October 7	Niger	Grasshoppers moved south more rapidly than expected, a function of the receding rains, and their decline in density coincided with the maturity of the grains, thereby minimizing damage; the GON believes that this year's emergency is essentially over and now will concentrate on a 2-year plan to strengthen the CPS
October 7	Zimbabwe	Though no locusts have yet been sighted, the MOA is convinced that swarms will come into the northeastern part of the country from Mozambique and Zambia and possibly into southwestern Zimbabwe from Botswana
October 8	Senegal	First shipment of malathion arrives (386 barrels)
October 8	Ethiopia	In general, both DLCO and MOA feel that the locust situation is currently not serious, although all organizations are continuing both ground and aerial surveillance; only threat is if large swarms develop in Saudi Arabia

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<u>Time</u>	<u>Country</u>	<u>Activity</u>
October 8	Sudan	The locust situation is not alarming at this time, but a large infestation of desert locusts has been located north of Kassala covering over 100 sq. km.; given the right weather conditions, there could be a large outbreak of desert locusts along the Red Sea coast during the winter breeding season (November-April); the emergency phase in Sudan is considered to be the period from September-December when both the African migratory and desert locusts are breeding and hatching
October 8	Sudan	Aerial spraying operations are currently being carried out in North and South Darfur against grasshoppers, in Damazine against African migratory locusts, and against a mixture of grasshoppers and African migratory locusts in Gederef
October 8	Gambia	FAO reported that the GOTG formally requested assistance for aerial spraying on October 3; situation has reached emergency status as grasshoppers have started moving from natural vegetation to cereal crops; the GOTG has identified 212,000 ha. in the Western and Lower River divisions as top priority areas for aerial spraying and another 108,000 ha. in the North Bank and McCarthy Islands divisions which also require aerial spraying
October 9	Gambia	The donor community and GOTG have identified the following needs: more small planes to conduct aerial spraying operations; enough pesticides to spray 265,000 ha.; and technical assistance to help monitor and coordinate spraying operations
October 9	S. Africa	South Africa has 213 units fighting locusts in 4 magisterial districts; recent cold weather slowed down the outbreak but accompanying rain will speed up hatchings as the days become warmer; the main outbreak is still in the endemic breeding areas of Karoo with some hatchings in the invasion areas of the eastern and northern Cape and Orange Free State; locusts are still in the 3rd hopper stage and only ground teams are being used

<u>Time</u>	<u>Country</u>	<u>Activity</u>
October 9	Senegal	Big planes scheduled to begin spraying 300,000-ha. area; engine of DC-7 caught fire shortly after take-off; plane crashed into harbor killing crew members Donald R. Parker (pilot), Fred Bryant Grantham, and Monroe Edward Bishop; Sergio Tomasino survived
October 9	Ghana	Grasshoppers (Senegalese in the north, variegated in the rest of the country) have been reported in Ghana; the GOG estimates that it needs 6,500 motorized sprayers and 10,000 liters of pesticides; the GOG has not yet made an official request to USAID, however
October 10	Mali/ Mauritania	Three of the big planes were scheduled to spray 50,000 ha. near the Mali-Mauritania border but were delayed due to the plane crash
October 10	Senegal	Second shipment of 386 barrels of malathion arrives in Dakar
October 11	Senegal	Remaining 3 DC-7s resume spraying operation
October 13	Senegal	The final 110 barrels of malathion scheduled to arrive in Dakar
October 14	Mali/ Mauritania	The 3 U.S. DC-7s sprayed 40,000 ha. in the border area on October 14 and did an excellent job
October 16	Chad	As of October 14, a total of 57,000 ha. of the targeted 160,000 ha. had been treated by air; the GOC issued appeal for food aid on October 10; 5,000 ha. have been treated on the ground
October 17	Gambia	The GOTG and donors agree on action plan; DC-7s are to spray 3 days in Gambia as U.S. contribution to international effort; the operation will be a combined big plane-small plane effort and will cover up to 220,000 ha. from the Casamance border to the Gambia River stretching inland 70 miles from the Atlantic; the EEC will spray the westernmost 40,000 ha., the Canadians the middle 80,000 ha., and the DC-7s the easternmost 100,000 ha.

<u>Time</u>	<u>Country</u>	<u>Activity</u>
October 18	Senegal	Spraying operation finishes; in 6 days, a total of 301,500 ha. of grasslands and croplands were treated with malathion
October 18	Senegal	The U.S. Ambassador, Woody Grantham (President of T&G Aviation), Sergio Tomasino, and the acting USAID Mission Director went to the village of Yoff to present certificates of merit and a new outboard motor to the two fishermen who saved Sergio Tomasino's life
October 19	Senegal	The 4 small Canadian planes treated about 120,000 ha. in Casamance October 18 and October 19
October 20	Burkina	Aerial treatment has covered 130,000 ha. of crop and pasture land in the Dori, Djibo, and Ouahigouya areas; the USG-financed helicopter has conducted surveys in a 17,400 sq.-km. area in the northeast (since October 15); hopper densities range from 1/sq. m. to over 150
October 20	Chad	A total of 102,000 ha. of cropland has been treated, of which 96,000 were done by air; this exceeds the OFDA target figure of 54,500 ha. for aerial treatment; air treatment took place in the Sahelian zone; present projected end date for aerial treatment is the end of October (using aircraft provided by France as 2 Cameroon planes broke their contract after completing only 40 of 150 contracted hours); treatment in Sudanian zone scheduled for November will be dropped unless verifiable need is confirmed
October 21	Gambia	U.S. DC-7s sprayed 85,000 ha. in Gambia on October 19 and October 21
October 24	Mali	The total area treated by air as of October 18 was 383,031 ha. with small planes and 20,000 ha. with large planes (total: 403,031 ha.); USAID was responsible for all the large plane spraying and 163,038 ha. of the small plane area

<u>Time</u>	<u>Country</u>	<u>Activity</u>
October 24	Mauritania	The total area treated by air as of October 18 was 58,544 ha. with small planes and 20,000 ha. with large planes (total: 78,544 ha.); USAID was responsible for all the large plane spraying and 30,444 ha. of the small plane area

1986-1987 Grasshopper/Locust Campaign Chronology

<u>Time</u>	<u>Country</u>	<u>Activity</u>
<u>1986</u>		
mid-1986	Ethiopia	From 1978 until mid-1986, there were no serious outbreaks of desert locusts or grasshoppers in Ethiopia, only solitary locusts in the traditional breeding areas. This was largely due to the long dry period which resulted in unfavorable conditions in the critical breeding areas of Ethiopia, Sudan, and Somalia. The return of moderate to normal rains in 1986 resulted in the growth of vegetation in the Red Sea coastal plains, a primary breeding habitat
August	Ethiopia	The first locust report in Ethiopia reached DLCO's headquarters and the MOA's Plant Protection Department from Afabet, Kamchawa, and the neighboring areas. Reports of grasshoppers at an estimated density of 15-20 per sq. m. were received from Tessene, Algieider, Humlera and Omhajer in Eritrea. Tree locusts and grasshoppers were reported from Tigray
September	Ethiopia	Control operations were mounted using fenitrothion
October	Ethiopia	One spray aircraft was positioned at Massawa to survey and control desert locusts along the Red Sea coastal lowlands
November	Ethiopia	In early November, control activity against desert locust populations was carried out in Humera and Tessena with satisfactory results. Toward the end of November, the coastal plains north of Massawa and the western lowlands were dry but the areas south of Massawa remained green, and some non-swarmling desert locust populations were sighted in the area
November 5	Cameroon	GRC indicates that insects had deposited eggpods before limited control measures were undertaken, which results in troublesome prospects for next year

<u>Time</u>	<u>Country</u>	<u>Activity</u>
<u>1986</u>		
November 20	Mali	GRM drew up summary budget of \$3.491 million. Mission and other donors request further information (survey results, calendar of work, operation plan) before responding
December	Ethiopia	In the first week of December, rainfall was reported at Arefale, Rahita and Zula. Wadi beds in the area were flooded and vegetation was green. Reports of scattered desert locust populations were received at Wadi Gulbab and Abdirbabo, samples of matured adults were received and mating was reported from Emit to Mersa Cuba. This breeding was the beginning of the first desert locust outbreak of the season in the coastal lowlands of northern Ethiopia. The source of this incipient population is not clearly known. But as breeding had been underway earlier in Sudan, some locusts may have migrated into these areas. Another possibility is that populations of local origin could have been unnoticed in the area where for many years neither ground nor aerial surveys had been conducted
December	Mali	CPS agents in the field for the eggpod survey
December 15	Chad	USAID/Ndjamena submits proposal to AID/W for emergency grasshopper control program
December 15 - Jan. 14	Cameroon	Training of 23 Chefs de Brigade by FAO expert in surveying, identification, collection and control activities
December 28	Chad	USAID/Ndjamena at AID/W's request prioritizes requirements for proposed program
January	Yemen	Ministry of Agriculture and Fisheries (MAF) approaches USAID for financial assistance for vehicles and infrastructure for their locust control unit

<u>Time</u>	<u>Country</u>	<u>Activity</u>
<u>1987</u>		
January	Ethiopia	Breeding continued over January 1987, and hatching commenced during the first half of the month and continued into February. Extensive aerial control operations were mounted against adults and hoppers by DLCO-EA in cooperation with the MOA. Several thousand small to medium-size hopper bands of various instars were put under control during the period December 1986 to March 1987
January 2	Sudan	USAID advises need to extend emergency program
January 3	Sudan	Swedish Micronairs 1986 donation needed
January 8	Cameroon	USAID/Yaoundé indicates that GRC will request assistance from USG amounting to \$200,000 for coming 1987 locust evaluation campaign
January 12	Gambia	USAID/Banjul requests technical assistance to assist GOTG in preparing detailed action plan
January 14	Mali	At donors' meeting, the Director of OPSR is requested to furnish an operation plan for 1987
January 21	Gambia	Gambia CPS begins eggpod surveys. Donor steering committee meets and decides: (a) the committee should be chaired by Permanent Secretary, Ministry of Agriculture rather than FAO representative; (b) eggpod surveys must be completed; (c) Gambian task force needs to develop detailed plan and requirements; and (d) technical assistance is required
January 24	Chad	USAID/Ndjamena requests immediate funding for technical assistance, pesticides, and transport
January 28	Zambia	Payment to the GRZ for the Phase I helicopter surveys; total payment: \$19,500
January 29	Mali	Mission presents funding request for \$1.385 million after consultation with Carl Castleton and CPS officials

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<u>Time</u>	<u>Country</u>	<u>Activity</u>
February	Yemen	OFDA offers TDY assistance to assess the locust situation, but the Ministry of Agriculture and Fisheries (MAF) declines the offer
February 5	Cameroon	FAO/Yacundé urges GRC to prepare for potential locust threat by organizing a coordinating committee, and establishing a strategy with needs assessment
February 10	Chad	Other donor funding secured for eggpod survey
February 11	Mali	GRM operation plan submitted at donors' meeting and agreement reached on the need for a technical committee, technical assistance for the CPS, and a command center. Plan includes elements of pre-season farmer training, farmer-based dusting, Phase I aerial spraying, and survey and follow-up by 14 mobile CPS teams. The plan calls for 75,000 ha. of ground treatment, 100,000 ha. of Phase I aerial treatment and 350,000 ha. of Phase 2 aerial treatment
February 12	Chad	AID/W concurs with TA request
February 12	Chad	U.S. Ambassador declares a disaster
February 12	Sudan	U.S. Ambassador declares a disaster
February 13	Gambia	U.S. Ambassador declares a disaster
mid-February	Mali	OCLALAV technical and administrative meetings in Bamako
mid-February	Mauritania	USAID/Bamako entomologist Ian MacKay participates in two-week eggpod survey training for Mauritanian CPS agents
mid-February	Yemen	MAF conducts its own survey in mid-February finding first generation hatches 100 km. north of Hodeidah. The MAF begins its locust campaign in the infested area
February 16	Chad	AID/W approves funds for technical assistance

<u>Time</u>	<u>Country</u>	<u>Activity</u>
February 20	Chad	USAID/Ndjamena identifies in-country transporter for pesticide
February 25	Chad	Eggpod survey begins and continues through April 5
February 26	Cameroon	USAID/Cameroon follows up FAO letter to GRC stressing FAO suggestions above
February 26	Sudan	Dutch-donated vehicles arrive Port Sudan
March	Mali	Local formulation of propoxur dust is underway by the OPSR factory. UNDP/FAO team visits for proposed UNDP funding of new CPS
March 8	Cameroon	GRC convenes first meeting of locust/grasshopper coordinating committee. All relevant GRC ministries and all donors are represented. Meeting is chaired by Minister of Agriculture
March 12	Gambia	Technical assistance team arrives in Gambia to assess state of readiness and make initial assessment of pending threat and requirements for campaign. One team member stays in the Gambia until March 28 to assist with planning
March 12	Sudan	Dutch-donated vehicles cleared customs
March 15	Yemen	MAP accepts U.K. offer of 20,000 liters of fenitrothion
March 15-21	Mali	Mission entomologist participates in GTZ-sponsored CPS agent training program in Mopti
March 17	Cameroon	Second coordinating committee meeting. Plan of action and needs assessment amounting to \$5.6 million are presented and discussed. Plan of action proposes farmer intervention in their fields, followed by crop protection agents spraying outlying areas and aerial spraying overall. Sub-Director of crop protection is charged with revising plan of action and a needs assessment, indicating materials on hand. USAID/Yaoundé agrees to assist in establishing radio communications net for emergency

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<u>Time</u>	<u>Country</u>	<u>Activity</u>
March 18	Yemen	USAID/Sanaa meets with Nasser Al Muafa, Counselor to the Minister of Agriculture, at the latter's request. MAF reports it was unsuccessful in controlling first generation in February. Second generation hatches about March 24. Minister of MAF authorizes Nasser Al Muafa to officially contact USG and other donors for campaign support. Based on the MAF's concern, OFDA and ANE recommend TDY assistance of Maghdy Ghieth from Cairo; MAF and Mission concur
March 23	Cameroon	Ambassador Frechette declares locust/grasshopper infestation disaster. USAID/Yaoundé requests \$200,000 be allocated for a grassroots training program including an FAO trainer and logistician, and one radio communications expert. Funds to be channeled through FAO/ECLC
March 25	Mali	Donors' meeting. Announcement of pledges include 250 MT propoxur (UK), \$1.5 million for Norwegian program in Kayes, \$385,000 Canadian aid to Odik (Nioro) and 210,000 ecu from the EEC. Mission requests 32,000 l. of malathion to complement existing stocks. CPS proposes a farmer training program by mobile teams and USG offers to pay fuel costs
March 23	Gambia	U.S. pledges \$96,000 for technical assistance for campaign and \$30,385 to conduct a train-the-trainers workshop
March 29	Sudan	Reg 16 waiver approved
March 30	Gambia	Two-week train-the-trainers program; participants are CPS personnel, extension agents, and PVOs. Workshop emphasizes proper and safe use of pesticides. Workshop was organized by local-hire coordinator
March 30	Yemen	OFDA-funded Maghdy Ghieth (from USAID/Cairo) begins survey

<u>Time</u>	<u>Country</u>	<u>Activity</u>
March 30	Cameroon	Third coordinating committee meeting. Plan of action has been revised to require \$3 million for treatment of 15,000 ha of cropped land by farmers and 70,000 ha by ground teams in Phase I, and 10,000 ha by ground teams with 70,000 ha by air in Phase II. EEC, Canada, and U.K. have provided \$73,000, \$140,000, and \$250,000 respectively
April	Ethiopia	Despite the intensive control operations, considerable numbers of grasshoppers survived and stayed in the area through early April, trapped by the unstable wind. The survivors, due to favorable ecological conditions, matured early and commenced further breeding. The survey and control operations thus continued with the same intensity against the second generation of swarms
April	Mali	USAID-funded Leslie McWain visits pesticide plant in Bamako
April	Yemen	Findings of the Ghieth survey report 5 hopper bands in the area from El Jannah, the southern limit, to the Saudi border, north, from the Red Sea on the west to Harad on the east. Ghieth recommends that a control campaign begin immediately to prevent serious problems that may develop by June. This ground survey contradicts an assessment made by the regional locust center located in Jeddah, Saudi Arabia. This center had not conducted a ground survey in the YAR as of April 3
April	Gambia	USAID-funded entomologist (Dr. George Allen) arrives
April 1	Gambia	USAID/Banjul hires former PCV to be local coordinator to assist ADO in administering USAID program inputs for campaign
April 2	Chad	AID/W approves reg. 16 waiver
April 3	Gambia	Localized infestation of early instars of <u>Zonocerus variegatus</u> detected in vegetable gardens in Western Division

<u>Time</u>	<u>Country</u>	<u>Activity</u>
April 5	Chad	Eggpod survey completed
April 7	Cameroon	Crop Protection head, Steven Njimyam, holds organizing meeting with crop protection units in far northern province
April 7	Sudan	Pesticide disposal team arrives
April 8	Cameroon	USAID/Yaoundé informs GRC that it has requested \$200,000 to fund training needs in the technical assistance as outlined in plan of action and provide services of radio communications expert
April 10	Cameroon	At fourth meeting of coordinating committee, West Germany announces assistance of pesticides, valued at \$125,000. British trainer Parker arrives and trains 219 crop protection personnel by May 6
April 11	Mali	USAID/Ndjamena and GOC sign limited scope grant agreement (LSGA) for technical assistance
April 12	Yemen	A meeting of representatives from U.K., FRG, the Netherlands, Japan, and the U.S. request that FAO coordinate the locust campaign. Additionally, each donor showed interest in supporting the YARG in its locust campaign
April 15	Cameroon	FAO grasshopper/locust specialist trainer arrives in-country
April 15	Chad	USAID/Ndjamena contracts entomologist (Habib Khoury) who starts work immediately
April 15	Yemen	Jeremy Roffey, FAO/Rome, reports survey findings to the MAF, FAO, and donor organizations stating that the current campaign is underway and should continue through May. He presented a detailed control plan and list of commodities needed. Donor coordination functions smoothly, FAO has now assumed leadership and a coordinating role of the donor community. By late April, the 20,000 l. of fenitrothion provided by the U.K. is being used by the MAF

<u>Time</u>	<u>Country</u>	<u>Activity</u>
April 15	Zambia	Second phase aerial surveys and spraying operation undertaken in Kafue Flats using 40 helicopter flying hours provided by Agricaire of Zimbabwe. Total payment is \$18,600
April 15-30	Senegal	OFDA-sponsored training course takes place in Dakar
April 16	Yemen	The Minister of the MAF chairs a donors' meeting. The U.S. Ambassador declares that the locust infestation constitutes a potential regional disaster and is cause for urgent U.S. assistance
April 18	Yemen	OFDA stands ready to provide \$25,000 for Ambassador's fund
April 18	Chad	USAID/Ndjamena repeats request for spray aircraft funds
April 19	Chad	USAID/Ndjamena requests funds for survey teams
April 19	Chad	Analysis of eggpod survey data is completed
April 22	Sudan	OFDA provides \$600,000 for extension of EEC/FAO grant
April 27	Mali	Creation of the new Service National de la Protection des Vegetaux as a division of the Ministry of Agriculture; proposal that OPSR become a mixed public/private investment factory
April 28	Sudan	Italian 1986 donation arrives
April 29	Mali	Mission receives dust masks
April 30	Sudan	Completion of Shell/PPD pesticide inspection

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<u>Time</u>	<u>Country</u>	<u>Activity</u>
May-early July	Ethiopia	The hazy weather conditions over the highlands and coastal plains of northern Ethiopia harbored a substantial hopper population that escaped aerial control operations, especially in the foothills and between the highlands (where ground control could have been very effective if it was feasible to mobilize ground teams). As a result, a third generation of swarms was produced during May 1987 and continued up to early July. Several swarms were intercepted and controlled by aerial spraying within a 50-km. radius of Asmara during May and June. Several reported swarms could not be either confirmed or controlled through aerial efforts due to prevailing weather conditions and poor visibility. Some of the swarms migrated westwards and were reported over Kassala on May 20, and some may have already moved further west to the summer breeding belt of Sudan
May 4	Chad	Areas of potential grasshopper infestations are prioritized
May 4-15	France	PRIFAS training session takes place
May 5-20	Chad	USAID/Ndjamena develops grasshopper survey plan
May 6	Yemen	FAO/ECLO comments on USAID/Sanaa's reporting cable of April 26. FAO/ECLO stated that there are "no more than 2-3 million locusts in YAR, that they were dispersing and would not breed again on the Tihama during 1986-87 winter/spring season. These would constitute no more than 50 ha. of a medium density swarm."
May 11	Mali	Request for funding for FAO expert position in the CPS and proposal of George Popov
May 14	Chad	USAID/Ndjamena and GOC sign first amendment to LSGA for in-country transport funds and pesticide

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<u>Time</u>	<u>Country</u>	<u>Activity</u>
May 14	Mali	Donors' meeting; farmer training program is underway; dust needs appear to be covered by pledges from EEC, U.K., and Japan; liquid pesticide needs estimated at 225,000 l. with 137,000 l. in-country and firm pledges of another 81,000 l.; deployment of radios is underway and infield distribution of formulated dust is continuing
May 15	Mali	Concurrence of OFDA helicopter contract
May 15	Sudan	Invitation to tender - USAID propoxur
May 15-22	Niger	A.I.D.-sponsored aerial application workshop takes place in Niamey
May 16	Yemen	OFDA establishes an obligation of \$25,000 based on the Ambassador's declaration; waiver 16 approved
May 16	Cameroon	GRC distributes 50 mobylettes to assist agents in crop protection activity
May 19	Cameroon	USAID/Yaoundé communications expert repairs and installs emergency radio net
May 21	Sudan	OFDA donation of fenitrothion arrives
May 22	Cameroon	Seventh coordinating committee meeting; China and Israel donated pesticides; the GRC allocates \$1 million to UTAVA crop protection fund; French provide training for one professional at PRIFAS; protective clothing donated by Great Britain arrives, pesticides on the way; FAO's Soumare organizes 6 crop protection teams
May 22	Sudan	Closing of tender and award to Luxon for 100 MT and air freight
May 25	Chad	AID/W approves funds for survey teams, tertiary transport, and airstrip repair
May 26 - Nov. 11	Chad	GOC fields survey teams
May 28	Chad	Pesticide arrives in Ndjamena
May 30	Cameroon	Survey team network established

<u>Time</u>	<u>Country</u>	<u>Activity</u>
May 30	Sudan	Lukas Brader, head of FAO/ECLO, visits Sudan to discuss medium-term program
June	Mali	Scattered rainfall in early June caused localized but widespread hatching of <u>Oedaleus</u> north of 14°40' N but densities remained low
June	Ethiopia	It was acknowledged in June that one area where donor contributions would clearly be needed was in support of aerial survey and control activities. DLCO's three operating aircraft are all over 40 years old, and all are in need of engine overhaul. For ground control activities, such items as land vehicles, mobile radio sets and protective equipment would likely be requested
June	Ethiopia	By June, the Ethiopian government viewed the locust situation as extremely serious and potentially very damaging to not only this year's crops but also to those in the next one-to-three years. The locust breeding patterns seemed to indicate a possible large increase in the population which could create problems not only for the short-rains crops, which were ready in some places, but also for the fall's meher crop, which had not yet been planted. A specially designated committee was appointed to meet weekly in Asmara to monitor and coordinate governmental response to the locust situation in the north. Members included the regional military commander, the regional administrator and the party secretary
June	Ethiopia	A general north-to-south movement prevailed in the locusts' movements in June, but a westerly turn was predicted for July, posing a threat to crops in Wello and Gonder
June 1	Chad	AID/W approves spray aircraft funds
June 1	Chad	USAID/Ndjamena contracts local administrative assistant

<u>Time</u>	<u>Country</u>	<u>Activity</u>
June 1	Gambia	USAID commits pesticides, training, additional technical assistance, and medical monitoring of personnel
June 1-July 7	Chad	USAID negotiates terms of spray aircraft contract
June 1-15	Cameroon	Demonstrations of dusters; establishment of early warning systems; establishment of campaign brigades
June 5	Chad	All pesticides prepositioned in 13 field depots
June 6	Sudan	338 MT propoxur arrives by air
June 7	Yemen	State 179296 summarizes OFDA's commitment for Yemen as of June 7: TDY assessment (Ghieth) \$3,441 10,000 l. malathion 37,382 15 MT carbaryl 67,275 protective clothing 2,500 Ambassador's Authority 25,000 TOTAL \$135,598
June 8	Cameroon	USAID/Yaoundé receives confirmation that agreement AFR/0017-G-IN-7036-00 granting FAO/ECLO \$200,000 for Cameroon has been signed
June 8-18	Sudan	AID sponsors train-the-trainer course in Khartoum
June 10	Gambia	Pre-exposure cholinestrase testing completed
June 10	Chad	USAID/Ndjamena and GOC sign second amendment of LSGA for survey teams, tertiary transport, and airstrip repair
June 10	Chad	USAID/Ndjamena and GOC sign third amendment of LSGA for AVGAS and spray aircraft services
June 11	Sudan	USAID approves L/C based on Min. of Plan approval, forwarded to Finance

<u>Time</u>	<u>Country</u>	<u>Activity</u>
June 12-23	Mali	Joint CPS/FAO/AID prospecting and evaluation of farmer training in eastern Mali (06/12-17) and in the Nara area (06/19-23). Approximately half (266 MT) of the required dust is in place. Mission provides CPS with sets of maps and field reporting forms
June 13	Sudan	338 MT propoxur arrives by air
June 14	Sudan	Distribution plans for chemicals finalized
June 15	Sudan	224 MT propoxur arrives by air
mid-June	Ethiopia	By mid-June, hatching of the third generation is in progress, and early and late instar hoppers will be sighted at the end of June. Aerial survey and control activity was mounted in the areas from Jula to Mersa Teclai and further north. The parent swarms of the third generation moved on to the highlands of Hamassen and Seray Awrajas. Aerial control action originating from Asmara beginning in the third week of June destroyed many of those swarms. Mortality was assessed at the various roost sites and the results were judged by DLCO to be satisfactory. In June, 25,000-30,000 l. of pesticides were used in Eritrea. 70,000 ha. were sprayed by air, and 10,000 more were covered by ground control operations
mid-June	Ethiopia	DLCO used Addis Ababa as the coordinating center for all of its operations within Ethiopia but attempted during this month to strengthen its logistical operations centers in the affected/potential affected regions of the country. The regional centers are located in Kombolcha (Wello), Dire Dawa (Harar), Azebo (Gonder), Bhair Dar (Gojjam), Mekelle (Tigray), and Asmara (Eritrea). The need for close coordination between DLCO and MOA zonal offices was stressed by donors during FAO Locust Control Coordinating Committee meetings. It was also emphasized that collaboration of the local farmers would be critical to the success of ground control strategies in the affected regions

<u>Time</u>	<u>Country</u>	<u>Activity</u>
June 16	Gambia	Minister of Agriculture calls meeting of ambassadors and senior donor reps to discuss remaining requirements of the campaign
June 16 - October 31	Cameroon	Surveys and spraying activities; total area sprayed 19,900 ha., or 34% of the infested area (30,000 ha. not treated), with 3 Micronair A07000, 160 Urgent sprayers; FAO reports 25%-65% mortality with dust and 80%-97% with liquid; the western section of the far north appears to suffer more from infestation than areas bordering Chad
June 17	Chad	USAID/Ndjamena procures avgas and diesel
June 18	Cameroon	Pesticides and dusting sacks arrive; control operations underway
June 19	Mali	Donors' meeting and update no. 3 with review of USG funding; summary of Mission-proposed aid for aircraft time, fuel, logistical support, training, technical assistance, and helicopter prospecting support
June 22	Ethiopia	MOA confirmed that 5 desert locust swarms had reached northern Tigray
June 22	Gambia	USAID-funded malathion arrived in Banjul port; radio equipment arrived via air freight
June 23	Chad	AID/W gives delegation of authority to USAID representative to sign contract for spray aircraft services
June 23	Sudan	411 MT bendiocarb arrives by sea
June 24	Sudan	ODA (U.K.) Land Rovers dispatched to west
June 24	Chad	Avgas and diesel prepositioned in 13 field depots
June 26 - July 4	Yemen	AID-financed Janice Jensen arrives in Yemen and conducts a pesticide disposal survey
June 28	Sudan	First swarm observed in Karnoi, Darfur

<u>Time</u>	<u>Country</u>	<u>Activity</u>
June 30	Yemen	One Yemeni from the MAF participated in the train-the-trainer course in Khartoum, June 8-18. Khartoum 7525, Para 6 and 7 stated that the participant was a "poor choice and lacked any plant protection experience."
June 30	Ethiopia	A swarm approximately 1 km. by 200-400 m. was seen 40 km. southwest of Mekele by an ICRC aircraft. Of the 16 high-risk breeding areas which were identified throughout Tigray, only 5 were readily accessible by existing planes and ground teams. Swarms were reported in the awrajas of Shire, Temben, Hulet Awlalo, Inderta, Raya and Azebo. Swarms were also reported on the Tigray/Wello border.
July	Mali	Rainfall remains irregular and generally below normal, with localized exceptions. Adult <u>Oedaleus</u> are reported migrating north and concentrations of young adults (up to 30 sq. meters) are noted in the Balle area. Widespread mating and laying of eggpods seen in Mourdiah, Dilly, Balle area and strong hatching of <u>Kraussaria</u> . Helicopter prospecting of West-Central zone by joint FAO/CPS team results in 5,000 ha. of aerial treatment (Balle, Mourdiah). Insecticide dusting trails in Dilly by FAO/CAMCO, through British project, Mourdian (propoxur, cholrpyrifos, bendiocarb, actellic-super). Malathion shipment arrives.
July	Gambia	Localized infestations of <u>O. senegalensis</u> and armyworms reported. Phase 1 ground operations begin on limited scale.
July	Yemen	The pesticide consultant (Janice Jensen) presents her draft report to the MAF and USAID
July 1	Mali	Mission acknowledges receipt of OEO funds, \$575,600. Grasshopper group hosts joint AID/FAO Rodent Evaluation Team, even though rats have two few legs(!). Dynamic representatives arrive to discuss pesticide testing program with AID and GRM

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<u>Time</u>	<u>Country</u>	<u>Activity</u>
July 1	Ethiopia	By first of July, all awrajas of Eritrea were affected with egg-laying mature desert locusts and hoppers, and the situation in northern Ethiopia continues to be viewed as alarming. Control operations moved away from the Red Sea coast where climatic conditions had become dry. Most of the locust swarms moved up from the wadis along the coast and into the highlands. Extensive areas were sprayed; however, the hazy weather conditions over the highlands prevented adequate survey and control. As a result, substantial hopper populations persisted in the highlands in pockets and ravines. Some of the highland swarms moved southwest and southeast through Tigray into the region of Wello
July 1	Chad	AID/W provides aerial treatment specialist (Alfred Rivas)
July 2	Yemen	USAID Director Sherper and Ambassador Rugh present 85 kVA generators and 25 pairs of protective clothing including masks to the Deputy Minister Mukbil of the MAF. In addition, the MAF is informed that the malathion has arrived and that the Sevin will arrive on July 5 at the port of Hodeidah
July 2	Mali	Donors' meeting reports that 418 MT dust in-country. Distribution of dust, bags and safety equipment is underway. CPS places 10 new Land Rovers in service. Sufficient liquid pesticides are in place to treat 450,000 ha.
July 3	Sudan	539 MT beniocarb arrives Port Sudan
July 9-11	Sudan	Chad/Sudan border meeting
July 10	Sudan	CICP confirms availability of team for environmental assessment

<u>Time</u>	<u>Country</u>	<u>Activity</u>
July 13	Ethiopia	The MOA called an emergency desert locust meeting for selected donors, NGOs, and U.N. agencies. MOA requested international donor assistance of \$3.16 million to support urgent action required to control the locust infestation in Ethiopia. The request for assistance (which included helicopter and fixed-wing aircraft flying time, pesticides and sprayers) was seen as the first phase of a major survey/control campaign. The two major strategies outlined for Phase I were: (a) that insecticide dust would be distributed to all infested areas and potential locust breeding areas (this strategy was first developed for Tigray and was already being implemented in northern Wello by MOA); and (b) that liquid pesticides for aerial spraying and aircraft fuel would be placed on strategic airstrips (this strategy was developed mainly for Eritrea in areas where the range of DLCO aircraft limits extensive control and surveys)
mid-July	Ethiopia	Most of the interior high-risk breeding areas in Tigray still had not been thoroughly surveyed. The locust swarms of most concern were those moving south-southeast through the Hulet Awlalo, Temben, Inderta, Raya/Azebo Axis. This generally followed the prevailing weather pattern set up by the ITCZ. Survey and control operations were mounted daily out of Mekele. Despite the control efforts, the feeling in mid-July was that locust swarms would be appearing with more frequency south into Wello. To date, little serious crop damage has been reported by MOA. However, crops were planted late to take advantage of the delayed main rains, and were expected to mature in August and September. If locust control is not vigorously pursued, crop maturation could coincide with locust emergency in mid-August or early September, a potentially grave scenario
July 19	Sudan	Arrival of Kooyman, grasshopper expert
July 20	Sudan	Arrival of Dr. Symmons, locust expert

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<u>Time</u>	<u>Country</u>	<u>Activity</u>
July 21	Sudan	Arrival of L. Pinto, CICP environmental assessment
July 26	Yemen	The U.S. pesticide donation is delivered to the warehouse of the desert locust control center at Hodeidah
July 26	Cameroon	Third phase locust surveys by ground team in the Mweru-Wantipa area did not locate any locusts
July 26	Ethiopia	37.5 MT of dust donated by Oxfam arrives in Asmara
July 27	Sudan	Dr. Hassan Abbas El Tom, FAO consultant and former head of PPD/Sudan, begins consultancy
July 28	Ethiopia	USAID/Addis Ababa issues a disaster declaration which stated that the locust situation in Ethiopia was such that we were faced with a potential calamity, involving an ecological threat, which menaced the fragile agricultural situation of the population of Ethiopia and which required immediate and urgent prevention and monitoring measures
July 29	Mali	Grant agreement signed with the GRM that obligated all AFR/OEO funds
July 29	Mali	Summary of U.S. contributions to date:

	U.S. \$000
1. 350 hours fixed-wing flying time	312
2. Aircraft ground support	108
3. Aircraft fuel	20
4. 100 hrs. helicopter and support (incl. fuel)	254
5. 32,000 l. malathion	290
6. Dust masks and scales	4
7. Dusting bags	10
8. Training	25
9. Vehicle rentals (incl. fuel allot.)	10
10. Technical assistance to Mission & PRIFAS	123
11. TA Popov/FAO	52
TOTAL	\$1,208

<u>Time</u>	<u>Country</u>	<u>Activity</u>
July 30	Sudan	Swarms in Karnoi, grasshoppers in southern Darfur
July 30	Chad	USAID/Ndjamena signs contract with PVO for aerial treatment services
August	Ethiopia	Eritrea continues to be the principal area of concern. Although drought conditions prevail throughout most of northern Ethiopia, the western lowlands of Eritrea received adequate rainfall levels and remained green and fertile. Consequently they continued to be a prime breeding area for desert locusts. One 8-sq.-km. swarm was reported in Keren, and another large swarm was reported in Afabet. Immature swarms produced in the Red Sea coastal area were reported in Akele Guzay and northern Tigray
August	Ethiopia	In Tigray and Wello, the late start to the rainy season and prolonged dry conditions meant that the hatchings and subsequent hopper infestations were less widespread than earlier feared
August	Ethiopia	The prompt and generous response by the international donor community (amounting to \$2.2 million, contributed by 6 governments - Australia, Canada, France, Sweden, Switzerland, and the U.S.; 2 private voluntary agencies - Oxfam and Band Aid; and the ICRC and FAO) enabled the MOA to have sufficient quantities of pesticides and equipment to intensify its campaign during the month of August. Special mention should be made of the contributions by Canada and the ICRC in providing 5 aircraft, both fixed-wing and helicopters, with additional logistical support by Australia and the USG. This was definitely a key factor in the sighting and subsequent destruction of a large number of hopper bands and locust swarms

<u>Time</u>	<u>Country</u>	<u>Activity</u>
August	Ethiopia	A Summary of the USG contributions, which also began to arrive in August: 35 MT of carbaryl \$150,464 Air freight cost for carbaryl \$53,200 10,000 face masks \$1,500 Equipment/first aid kits and protective clothing (USG grant to FAO) Canadian helicopter logistical support (USG grant to FAO) \$140,000 TOTAL \$373,664
August	Mali	Soumana Sountera named Director of CPS
early August	Gambia	Pest reports from field identify the primary threat to crops as hairy caterpillars, army worms, millipedes and localized nymphal grasshoppers, primarily <u>O. nigeriensis</u> in natural vegetation. Phase I ground operations continue
August 5	Sudan	CICP team departs
August 6	Sudan	198 MT propoxur arrived Port Sudan
August 8	Sudan	Bendiocarb cleared port
August 8	Chad	Aerial treatment by MAF starts
August 12	Sudan	152 MT propoxur arrives Port Sudan
August 13-14	Sudan	Swarms arrived in Khartoum province
August 14	Mali	Dynamac begins field operations
August 15	Mali	Dynamac Corporation signed formal protocol with GRM to test eight pesticides for efficacy and environmental impact. First phase small plot testing was completed
August 15	Zambia	Fourth phase aerial surveys and spraying operation in the Kafue Flats. A total of 45.15 helicopter flying hours were clocked by the Safari Air Services helicopter
mid-August	Ethiopia	10,000 l. of basudin pesticide, 50 knapsack sprayers, and protective equipment donated by Switzerland arrives in Asmara

<u>Time</u>	<u>Country</u>	<u>Activity</u>
August 18-25	Mali	Mission entomologist prospects Mopti and Senomango using Evergreen helicopter. Approximately 10,000 ha. infested with <u>Oedaleus senegalensis</u> nymphs (L4, L5) and young adults. Aerial treatment recommended
August 20	Sudan	Emergency procurement of radios approved - through FAO
August 24	Ethiopia	37.5 MT dust donated by Band Aid arrives in Asmara
August 24	Chad	Aerial treatment specialist (Alfred Rivas) resigns
August 26-28	Mali	Regional grasshopper meeting held in Bamako
August 28	Mali	Air service aircraft deployed; 448 MT dust in place; malathion stocks in place in the field; Carl Castleton visits Dynamac operations to discuss problems in application techniques
August 28	Sudan	Two Cessna 188s positioned in El Fasher
late August	Gambia	Ground and limited aerial spray operations conducted to control outbreaks of grasshoppers in natural vegetation bordering rice land
September	Mali	In general, rainfall is lower than normal and irregularly distributed. Despite this, locally good rains promote the development of patchy high densities of sedentary species (<u>Kraussaria</u> , <u>Hieroglyphus cataloipus</u>) causing damage to crops, particularly in the western (Kayes) and central (Bally, Nara, Dilly) areas. Aerial operations began against these infestations (59,000 ha. in Kayes-Yeli-mane, 47,000 ha. in Nara-Dilly). The center of gravity of <u>Oedaleus senegalensis</u> adult populations moves above 15 degrees north and a heavy overlap of generations is seen

<u>Time</u>	<u>Country</u>	<u>Activity</u>
September	Mauritania	Helicopter prospecting of northern Mali and southern Mauritania gives first indications of intense hatchings of <u>Cedaleus</u> in southern Mauritania
September	Gambia	Increasingly high grasshopper populations of major economic species are reported in grasslands bordering rice fields. These include <u>Hieroglyphus daganensis</u> , <u>Catolopius fuscocoerulipes</u> , <u>Kraussaria anquilifera</u> , and <u>Kraussela amabile</u> . Ground operations and aerial spraying continues
September 1	Sudan	Dr. Awad, FAO survey expert, arrives
September 7	Sudan	Locust unit training course, Khartoum
September 8	Cameroon	During ninth meeting of coordinating committee, the control operations are summarized. The GRC claims to have treated 54,000 ha. out of the targeted 90,000. FAO records indicate 10,000 ha. were treated. FAO reports that bad rains in June and July prevented first generation insects from reproducing. Second generation insects were adversely affected by abundant rains in July. Danger from African migratory locusts from Chad and Nigeria persists. Phase II needs to be revised by September 30
September 8	Gambia	Mid-season cholinesterase testing completed
September 9	Sudan	DLCO/EA Islander arrives
September 10	Sudan	Radios arrive (not yet cleared)
September 13	Sudan	PPD aircraft hire contract signed
September 13	Sudan	Second CICP visit
September 15	Sudan	L. McCulloch, team leader departs - replaced Mark Gorta, spraying consultant, FAO
September 15	Sudan	198 MT propoxur cleared port, dispatch begun
September 16	Sudan	Second DLCO/EA Islander arrives

<u>Time</u>	<u>Country</u>	<u>Activity</u>
September 18-19	Sudan	DLCO/EA sprays in northern Darfur
September 20	Sudan	152 MT propoxur cleared port, dispatch begun
September 24	Mali	Dynamac has completed large-block spraying trials. Dynamac aircraft have treated 12,000 ha. of infested cropland for CPS
September 24	Mauritania	Further vehicle prospecting delimits extensive <u>Oedaleus</u> populations in southern Mauritania and USAID mobilization of aircraft and pesticides from Dakar ensues
September 24	Mali	Canadians mobilize two aircraft for Nioro-Touil
September 27	Sudan	Phil Symmons arrives for design of medium term program
September 30	Sudan	Dr. Awad departs
September 30	Cameroon	Plan of action for Phase II to be revised once more
September 30	Zambia	Request for extension by GRZ of the Zambia Emergency Locust Control Project 611-0201, Project Assistance completion date denied. Remaining funds to be deobligated
September 30 - October 1	Sudan	Spraying in Musbat, northern Darfur
October	Ethiopia	Summer breeding failed in the Danakil Depression due to lack of rainfall. The absence of locusts, in the traditional summer breeding habitats south of Mekele (Wello, Hararge, Shoa) has drastically reduced the chances of locust movement to the winter breeding areas of eastern/southern Ethiopia and Somali Republic. The failure of breeding in these areas will mean that the threat of locust invasion to the East Africa countries is averted

<u>Time</u>	<u>Country</u>	<u>Activity</u>
October	Ethiopia	To prevent any possible surprises from local populations and/or populations migrating from outside Ethiopia, ground and aerial survey will continue in Eritrea. DLCO warned that breeding areas could be invaded by local populations and others which could migrate from west and north of the Sudan border from late October to early December
October	Mauritania	Rapid drying of vegetation in southern Mauritania in the first part of October causes <u>Oedaleus</u> L5 and young adults to move into fields. Heavy damage is noted to millet and sorghum. Aerial spraying is undertaken by Malian teams in southern Mauritania, funded by Canada and USAID
October 1	Mali	Grant agreement for an additional \$45,000 was signed with the GRM (for Nara Turbo Thrush spraying)
October 2	Sudan	Second CICIP team visit ends
October 5	Mali	Visit of grasshopper campaign environmental assessment team, George Cavin and Carrol Voss
October 5-13	Mali	T & G Turbo Thrushes spray 37,000 ha., based in Nara
October 8	Sudan	Rome concurs in purchases for incineration program
October 10	Sudan	DLCO/EA to Darfur with team leader
October 10	Mali	Evergreen helicopter contract ends
October 10	Mali	40,000 l. malathion arrives from Dakar
October 11	Sudan	Continued spraying in northern Darfur
October 13	Sudan	All propoxur deliveries complete
October 14	Sudan	Control of swarms in southern Darfur
October 17	Mali	Aerial operations by Pawnee and Cessna end in Djigueni with 25,000 ha. sprayed

<u>Time</u>	<u>Country</u>	<u>Activity</u>
October 19	Cameroon	Plan of action for Phase II distributed. Total needs for Phase II are estimated at \$1.2 million to cover 10,000 ha. by ground and 70,000 ha. by air (the earlier estimate was \$1 million)
October 21	Cameroon	FAO evaluation team presents findings: 1) Emergency in northern Cameroon is over 2) Further needs can be met with materials on hand 3) Continuing crop protection activities should be carried out under ongoing national projects (such as bait tests under WCRE) 4) Need for continuing grassroot training in insect identification and pesticide handling
October 22	Chad	All aerial treatment is completed
October 26	Sudan	Evaluation mission departs for west. Preparations for winter campaign begin
October 30	Gambia	Ground and aerial operations completed. Phase down of campaign begins. Technical assistance personnel depart
late October	Mali	Ground prospecting by Mission entomologist at the end of October shows a band of <u>Oedaleus</u> adults laying above 15°20' N, in the central zone (Ball, Nara, Dilly)
November	Ethiopia	Since the latter part of August, the locust situation in Ethiopia could be characterized as very calm. The only reports of locust activity were scattered patches of adults in Eritrea. Unconfirmed reports of hoppers in the western lowlands of Eritrea were received but could not be verified due to the inaccessibility (due to security concerns) of the areas in question

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<u>Time</u>	<u>Country</u>	<u>Activity</u>
November	Ethiopia	<p>Looking ahead to the 1987-88 winter campaign (November through January), preparations are required to stock adequate supplies of pesticides, spray and transport vehicles, ground control equipment, survey and control aircraft, and planning for other logistics support. A number of activities are already underway: (a) Representatives of LIFTAIR (the Canadian-funded helicopter company operating in Eritrea), ICRC, DLCO, and MOA have been meeting to determine a plan for the optimum use of aircraft through the end of the year. (At present DLCO has two aircraft in-country, there are two lift-air helicopters, and two ICRC aircraft. ICRC considers its involvement in aerial survey and control at a close. However its two planes will remain in Ethiopia for the Agency's own operational needs and could be redeployed for locust control on very short notice if needed.) (b) A survey of pesticide stocks in Ethiopia is being conducted throughout the fall and early winter. Funded by Oxfam and organized by a committee made up of representatives of FAO, MOA, Oxfam and the U.N. Emergency Planning and Preparedness Group, it is hoped that the survey will become an annual activity. At this time there is no need for further contributions of pesticides by donors. (c) In preparation for the upcoming campaign, MOA has stressed the importance of well-prepared and well-equipped ground teams. MOA hopes to fit several Land Rovers with exhaust nozzle sprayers and plans are underway to preposition pesticide stocks in strategic areas</p>
November	Mali	<p>Ground treatment of desert locusts underway in the Adrar Des Iforas and Malian Tamesna by joint Algerian/GAO OCLALAV teams</p>
November 3	Mali	<p>Donors meeting, with preliminary reports of the campaign. DPS Director confirms that all empty pesticide drums are stocked at CPS grounds, Bamako, pending disposal</p>

<u>Time</u>	<u>Country</u>	<u>Activity</u>
November 8	Sudan	FAO evaluation ends
November 9	Mali	Italian entomologist will begin equipment training for donated truck-mounted cannon sprayers and handsprayers
November 10	Cameroon	USAID/Yaoundé informed that remaining \$47,000 of ELCO grant being returned to OFDA and not available for funding further training
November 15	Mali	Eggpod survey work begins
November 15	Cameroon	Mr. L. Soumare and A. Giner, grasshopper/locust specialist and logistician respectively, funded by USAID and fielded by FAO/ECLO, depart Cameroon
November 18	Cameroon	FAO/Cameroon presents accounting of U.S. funds to GRC, indicating \$47,846 remain in account for programming
November 18	Cameroon	FAO/Cameroon objects to validity of evaluation team's findings due to: 1) Briefness of evaluation team visit 2) The fact that 38,000 ha. were not treated which means <u>Oedalus senegalensis</u> had laid eggs, is now endemic and will recur 1988
November 23	Chad	Entomologist (Habib Khoury) departs Chad

GRASSHOPPER/LOCUST QUESTIONNAIRE RESPONSES

I. EARLY WARNING

1. What should U.S. relationship be with PRIFAS?

- The U.S. should support PRIFAS by providing data and should support FAO funding for PRIFAS. The remote sensing data should be provided to PRIFAS. (Senegal: E. Huddleston)
- At least at a level of fairly frequent contact and information exchange. (Senegal, Mali, Burkina Faso: R.G. Adams)
- Not completely familiar with the role of PRIFAS, but am of the opinion that we should stay aware of the predictive modeling capabilities of PRIFAS and perhaps encourage some collaborative research. (Sudan, Mali: G.A. Schaeffers)
- Should cooperate but not be subservient. (No locale: F.M. Philips)
- The USG should continue to work with PRIFAS and any other agency or group that can provide assistance with pest control programs. (Chad: P.W. Orr)
- The U.S. relationship with PRIFAS should include cooperation in conducting and coordinating grasshopper surveys on an area wide basis. Although the history of area wide integrated programs has been disappointing, an international approach involving existing organizations remains the desirable long term strategy. Grasshoppers do not recognize national boundaries. (Senegal: K. Seethaler)
- Although this is a French research organization rather than an international agency the U.S. should support PRIFAS by technical means. Cooperation in improvement of biomodels or establishment of biomodels for some countries (e.g. Chad) through temporary assignments of the U.S. experts to work with French scientists. (Chad, Niger: J. J. Drea)
- U.S. should continue to maintain a close working relationship with PRIFAS and continue to encourage African nations to provide the information needed for timely forecasts. Utilize PRIFAS as a training facility for French speaking African nations. (Senegal: G.E. Cavin)
- U.S. Government should cooperate with PRIFAS through assistance efforts where and when needed to promote efficient and environmentally sound pest management activities. (Mali: L. Yarger)
- I have been troubled by mixed opinions with regard to PRIFAS. On the one hand I believe that this type of effort is deserving of attention and support as a research project. The literature shows that in one instance, the 1984 Australian Plague Locust outbreak in Australia, a simulation model, in conjunction with satellite imagery, was successful in explaining the cause of the outbreak, post hoc. Although this example does not represent a predictive success, it is the most successful use of such methods that I was able to find in

the literature, and it provides an important contrast with the PRIFAS effort on three points:

i) the model used was a reasonably sophisticated biological simulation model, of which there are many fine examples coming from US researchers today. The model included many of the quantitative details of the biology of the Australian Plague Locust, such as fecundity, rates of growth and estimates of mortality from various sources. -- The PRIFAS model, on the other hand, is still at the most rudimentary stage of modeling, and hardly warrants being called a simulation model at all, even though the principal researchers have had 10 years to work on it.

ii) the Australian researchers employed not just a model, but satellite imagery, current detailed weather maps, and a serious scouting effort as well. The PRIFAS effort seems to depend too heavily on a poor method, with insufficient input from, albeit, insufficient satellite and weather data, and an almost blithe disregard for field scouting.

iii) The Australian research and reporting effort conforms with internationally accepted methods for presenting the results of research. -- The PRIFAS literature suffers from a very major and disconcerting fault: most of the information that is presented is the translated results from mostly English publications, however the original sources are not cited in the body of the text (even though extensive bibliographies are sometimes provided). Not only does this promote confusion as to what is speculation and what is proven fact, this oversight makes it impossible to review the documents for further research. Equally important, this manner of presenting research is blatant plagiarism and is more in keeping with a Madison Avenue advertising effort than a serious scientific endeavor (It should be noted, however, that at least the efforts of PRIFAS have allowed some of the literature on grasshopper research, which is mostly in English, to become accessible to French-speaking audiences).

In short, I do not believe the interest of the African countries, nor the US, will be well served by USAID having anything to do with PRIFAS. I believe that key personnel in FAO have come to similar conclusions. (Burkina Faso: W.H. Settle)

--- I'm really not that familiar with PRIFAS. I was very impressed with the Launois report I read (once you cut through the "I told you so aspect"). Maybe they just talk a good line, or possibly they're actually doing something worthwhile. We should find out. PRIFAS has, supposedly, developed a model with the capacity to predict future population trends. If this proves to be accurate, it would seem to have great usefulness for all host countries and donors concerned with grasshopper problems in the Sahel. The relationship of the U.S. to PRIFAS would depend on the validity of their work, and our mutual willingness to cooperate. At the very least their input (predictions) should be taken into account in preparing for future grasshopper campaigns. (Senegal, Mauritania, The Gambia: B. Overholt)

--- PRIFAS was not active in the local Locust Campaign. The Mission would like to receive their bulletins on regular basis. (Cameroon: J. Dorman and M. Lang)

- AID should continue to use PRIFAS for training of host government and USAID personnel as this proved to be a very worthwhile investment. The training was practical and helped us prepare our control program. We learned how the infestations would develop and what was most likely to occur as the season progressed. In addition, AID should contract directly with PRIFAS for technical assistance to help analyze the development of grasshoppers and locusts in each country. This gives USAID better control of the service being provided and can ensure a thorough analysis of each country's situation. USAID should also encourage the collection of field data for PRIFAS and provide feedback on PRIFAS reports as some of the information was not always correct. (Chad: USAID)
 - PRIFAS should be technically intensified and financially strengthened. (Chad: J.E. Ohabvike)
 - USAID should comment, verify, or correct information provided by PRIFAS. This should be based on actual information collected in Chad by survey teams and entomologists. (Chad: V. Diefenthaler)
 - No change-limited; newsletter/training/publications/consultation. (Abidjan: J.A. Franklin)
 - The US should continue its relationship with PRIFAS in an open, professional manner. More importantly, efforts should be made to establish technical relationships with the organizations concerned with grasshoppers and locusts, e.g. TDRI. (Mali: Bamako technicians)
 - The United States should maintain close collaboration with PRIFAS. (Mali: S. Sountera)
 - (USIAD cooperation with PRIFAS should be) stronger and more coordinated than it is now. Rather than merely accepting information from PRIFAS, U.S. should work with this French research group.
- Additional Question: What should Africa's relationship be with PRIFAS? Here again, PRIFAS should make stronger efforts to work with African research organizations, rather than just supplying information. This would allow Crop Protection Services dealing with grasshopper/locust problems to take the problem solving aspect of the issue into their own hands. (Mauritania: W.B. Thomas)
- AID's relationship with PRIFAS should be to permit access to PRIFAS' assessments on a timely basis. We should ensure AID's resources in remote sensing and telecommunications are available to permit timely and accurate assessments.
- AID can continue to use PRIFAS for training and technical assistance, but with the clear understanding that self-promotion and the politicization of crop protection methods are not subjects with which we are pleased or will support. (Burkina Faso: C. Kelly)

- Training U.S. technical advisors. Translation of PRIFAS information into English. (The Gambia: A. Laurence)
- PRIFAS has workshops on grasshopper identification and is a good forum for exchange of ideas and new technology/developments. Fluent French is essential for attendance of their courses. (The Gambia: A. McKenzie)
- Functional relationship between USAID and PRIFAS, especially since USAID began to work on these different ravagers with the CICSS projects, which unfortunately were suspended. (Mauritania: Tahara Galledou)
- Collaboration in the field of grasshopper/locust research activities.
 - information exchange and distribution
 - management of training program
 - strategies for large scale interventions(Chad: Ngaromillet Michel)
- The same goes for locust previsions made from a distance: (PRIFAS system) where signalling from the start should be subject to controls by Crop Protection Service (CPS) as soon as they show a special form as well as for PRIFAS previsions. (Burkina Faso: Gana Diagne)

2. Should we continue efforts with remote sensing?
- The remote sensing project should be continued with weekly maps during the critical first generation period. Delivery time must be shortened by telephone, telex, or facsimile transmission. (Senegal: E. Huddleston)
 - Yes, the benefits are definite, and will continue to improve with time. Some training in applications will need to be done with field personnel. (Senegal, Mali, Burkina Faso: R.G. Adams)
 - Remote sensing is not useful unless some system of direct and immediate transmission to African centers is accomplished. Even this is only of value in locating potential sites of feeding and oviposition. I am not high on remote sensing for managing campaigns. (Sudan, Mali: G.A. Schaefers)
 - Remote sensing should be used to identify and stratify areas where potential pest problems could develop. (Chad: P.W. Orr)
 - Efforts with remote sensing should be continued because of potential savings in on site inspections. However, remote sensing does not give an entire picture of what is occurring at any given site. It is possible, however, to obtain area-wide vegetation cover trends from satellite data. (Senegal: K. Seethaler)
 - 1987 results indicate that information obtained through accessible systems has only marginal benefit because of poor information turn around time. AID should perhaps leave further study to FAO or other donors. (Senegal: G.E. Cavin)
 - Continue efforts in remote sensing. Strategies that show promise of developing into methods of providing cost efficient and accurate surveillance information of pest populations, as well as crop conditions, over large geographic areas such as the Sahel, should be encouraged. (Mali: L. Yarger)
 - Yes, but this tool is insufficient by itself. The necessary triad for advanced early warning capabilities must include: i) satellite imagery, ii) simulation models, and iii) good field scouting reports. (Burkina Faso: W.H. Settle)
 - I'm not sufficiently familiar with the use of remote sensing for prediction of grasshopper outbreaks to say whether we should continue efforts in that area (I don't even know what our efforts are). Grasshoppers certainly respond to rainfall, vegetation, and edaphic factors, and therefore it would seem that remote sensing would have some value. (S.F. Miller)
 - Remote sensing efforts should be continued. Satellite imagery can be very useful for early season grasshopper survey and control efforts and mid to late season locust control. Imagery received this year was used to better orient Locust Survey/Control Teams in the vast remote areas of Northeastern Chad. Unfortunately, imagery was

received a bit too late to be used by the FAO funded survey helicopter which spent most of its flying time in random search for locust. (Chad: USAID/Chad)

- Respondents agreed that we should continue efforts with remote sensing. One replied that satellite remote sensing techniques are invaluable tools to determine potential locust breeding sites. (Ethiopia: USAID)
- Sudanese respondents stated that an early warning survey should include the use of local scouts, remote sensing and aerial survey in known breeding areas. Several of them also stressed the need for more reliable transport and fuel supplies, especially at the beginning of the rainy season. Symmons thought locusts should be regularly monitored but not grasshoppers. Gorta, on the other hand, suggested regular transects in selected or random sites representative across the Sahel with emphasis on areas that have received rain. Special emphasis should be placed on those areas that receive good rains after a drought. Almost everyone agrees that efforts with remote sensing should continue. Symmons' response was a qualified quote yes unquote in that only weather and green areas should be monitored. (Sudan: GH/L Program)
- Yes, we feel that it has potential in conjunction with other mapping techniques. (Mali: USAID/Bamako technicians.)
- By all means. The satellite greenness maps were very well received in Mauritania, and should be continued. (Greenness maps should be continued.) Especially in the Sahelian countries, where there are so many inaccessible regions where rain and subsequent biomass accumulation can go unnoticed by conventional weather gathering and survey methods. The one problem with the maps used this year was lateness of arrival. However, this could easily be rectified by electronic transmission of the maps. This could possibly be less expensive than the present system as well. (Mauritania: W.B. Thomas)
- Yes, remote sensing data for the locust problem was timely and useful for Niger. Improvements in transmission time, field training and scale of maps will lead to improved and more rapid vegetation assessment for grasshopper and locust operations. Use of remote sensing imagery will also aid in the evaluation and assessment of overall agricultural conditions. (Burkina Faso: C. Kelly)
- Remote sensing was essentially conducted in 1987 by Village Teams. However, by the time these results got to the District or the Regional Agricultural Office level, there often were lengthy delays and/or the estimates of the degree of the danger of infestation, (the case of Tanout and Dakoro in September 1987). To avoid these kinds of errors, it is absolutely necessary to implement an Early Warning System capable of timely detecting any attack by crop predators. Remote sensing should be continued from the experimental stage until it reaches the final completion (which still seems very remote). During the critical period, an aerial survey of the area every 10 or 15 days by a CESSNA 185 type aircraft seems like an efficient

approach. This may also be done for locust surveys. As far as Oedalensus is concerned, information supplied by the National Meteorological Service is fully sufficient to warn control services. (Niger: M. Germaux)

- Of little use in such a small country. (The Gambia: A. McKenzie)
- Satellite imagery should be used and analyzed to provide accurate data on grasshopper/locust evolution in relation to climate and vegetation. (Chad: Ngaromillet Michel)
- Remote sensing is useful to us to determine rains and favorable zones for locusts development. However it should be associated with field controls in order to confirm the previsions. (Burkina Faso: Gana Diagne).
- Remote sensing is a useful tool in as much as it furnishes information on rainfall, areas favorable for crickets and grasshoppers, etc. (Burkina Faso: Peter Dettmar)
- A functional relationship, justified by the gathering of data which is often carried out in Africa; although personnel are available, there is no means of processing this information with a view to setting up a provisional program on the incidence of ravagers.

Delays have often been noted in the transmission of maps, the number of which is also limited. For us, remote sensing should extend to the Algerian border. (Mauritania: Tahara Galledou)

3. Are egg-pod surveys accurate? If so, when should they be conducted?
- Egg-pod surveys are probably not cost effective. Egg-pod surveys require expertise and experience to correctly identify species and to interpret results. (Senegal: E. Huddleston)
 - Egg-pod surveys from my limited observation appeared to be a slow, expensive, difficult to achieve assessment. If done in inhabited areas, there would be people there to report a heavy hatch well in advance of needed treatment. As shown in 1987, knowledge of extensive egg laying in 1986 did not mean much in predicting infestation since the variables of environmental and weather conditions dictated spots of heavy hatch and development. In other words, to what extent should one spend resources to position pesticides, equipment and manpower just on the knowledge that there are a lot of eggs in a particular area? (Niger, The Gambia: C.M.Voss)
 - I don't know. Dr. Thornley indicated that they are not particularly useful and are not done in the States. I believe Dr. Philips agreed. (Senegal, Mali, Burkina Faso: R.G. Adams)
 - Egg-pod surveys, in the hands of credible scouts, could provide useful information on potential sites of origin and perhaps numbers. They cannot predict levels of eventual parasitism or the impact of variable rainfall patterns on egg or nymphal survival. (Sudan, Mali: G.A. Schaefers)
 - They are indicators only. Should be conducted in dry season. (F.M. Philips)
 - Egg pod surveys and other predictive techniques should be used wherever practical. They should be conducted during the oviposition period for the pests involved. (Chad, Niger: J. J. Drea)
 - Egg surveys are not accurate predictive tools. Conducted in the Fall they are indicators as to whether or not eggs were actually laid. Surveys in the Spring provide data on dry season survival and percent predation. (Senegal: G.E. Cavin)
 - My feeling is that egg pod surveys are extraordinarily difficult, time consuming and that the information they aim to provide, i.e., the locations of grasshopper concentrations for the following season, can be better gained by late season scouting for ovipositing final brood adults. Another way of thinking about it would be that egg production has a straightforward relationship to adult populations, and adult populations are much easier to see and measure than egg pods. (Burkina Faso: W.H. Settle)
 - From my experience in Mauritania, egg pod surveys are very difficult to implement and provide little information that couldn't be obtained more easily elsewhere. Brood survey efforts at the tail end of the season should pinpoint where mature females are ovipositing. This is where they will hatch out the next season. Why dig around in the

soil if observation has indicated where the eggs are? But I am open-minded. If research results suggest that egg pod surveys have some value, I may change my mind. I'm a firm believer that this type of research should be conducted. Use in national programs would depend on the results of the research. (Senegal, Mauritania, The Gambia: B. Overholt)

- They give some prediction data, but weather (rain) is the most important factor. Conduct surveys after the "growing season." If done a month or two before egg hatch in the Spring, this would account for winter mortality. (Mali: S. Tunnock)
- Not verifiable. To be conducted between November - January. (Cameroon: J. Dorman and M. Lang)
- No. Scouting techniques (should) be taught to agricultural monitors. (Cameroon: S. Njymian)
- Egg-pod survey in Chad proved to be good enough to identify areas most likely to have heavy grasshopper infestations. The survey was not accurate in predicting expected densities but it enabled us to prioritize areas where pesticides would need to be prepositioned. In the Sahel, egg-pod surveys should be conducted in December, right after the harvest at a time when farmers remember where they saw grasshoppers laying eggs.

Chad: USAID

- (Egg pod surveys are) 70 percent accurate but could be improved by standardizing the teams. These should be conducted between November and January, when soils are less dry and areas of infestation fresh in mind. (Chad: J. E. Ohabvike)
- Egg-pod surveys are important. They provide good information. They should be done in November and December. (Chad: V. Diefenthaler)
- Egg-pod surveys are accurate depending on who carries out the survey. If properly conducted it would give the scale and magnitude of the locust populations. It should be carried out before the onset of rains/egg fields should be detected at the time of egg laying. Egg-pod surveys from a swarm could be accurate if seen at time of oviposition. (Ethiopia: USAID)
- Three people said egg-pod surveys are accurate. Four expressed the opinion that it was difficult to detect egg-pods or that the large areas involved would make this strategy impractical. (Sudan:GH/L Program)
- Egg pod surveys (are) considered helpful when matched against known adult infestations of preceding season and to help identify potential problem and problem areas for following year. Thought by CPS to be best conducted in Guinea-Bissau in November - 15 December. Believe biometric designed surveys for egg pods should be considered, at least for some species, as basis for prediction. Believe field work

is needed to correlate egg density/survival rates/appropriate timing for egg-pod surveys to adult densities that follow and to determine merit of egg-pod surveys. (Guinea-Bissau: J. A. Franklin)

- Yes. A properly conducted end of season survey which includes explicit egg-pod surveys is very valuable for indicating areas of high risk in early season. The survey should be conducted after all control operations are terminated and major late grasshopper movements are complete. (Mali: USAID/Bamako technicians)
- Ootheca surveying gives a rather precise idea of the potential infestation for the eradication campaign. It should be done right at the end of the campaign. (Mali: S. Sountera)
- Having not worked directly with such a survey, I can not say how accurate they really are. However, by studying the results of last years egg-pod survey in correspondence to the grasshopper problems this year, it seems the survey does give an indication of potential areas of infestation. In Mauritania, the best time to conduct such a survey is the spring, after the desert locust season is over. (Mauritania: W.B. Thomas)
- Field agents in Niger reported egg-pod surveys accurately defining some of the areas of intense grasshopper infestations during 1987. The reliability of survey data and procedures is not known. (Burkina Faso/Niger: C. Kelly)
- They can be an indication of densities and degree of predation. Is not too difficult provided it is done carefully. Should only be done for major species in their most likely oviposition habitat.

Conducted: 1. End rainy season (In Gambia beginning November for the major, big species)
2. Immediately after the first rain
(The Gambia: A. Laurence)
- No, they are not accurate, but if done they should be done before the grasshopper/locust season begins. (Niger: CIDA: F. Boillargeon)
- Yes, but data should be made readily available so that it can be used for forecasting. (Senegal: A. B. Ndiaye)
- Assessments are necessary because they provide areas in which to preposition commodities. Assessment can be done in two phases during and after the grasshopper/locust control campaign. (Chad: Ngaromillet Michel)
- In our opinion these evaluations of egg-pods are not useful. Not only that they are time-consuming but about 30 minutes are necessary to correctly unearth an egg-pod. So we did not recommend such an exercise in Burkina. We think it is better to find towards the end of the campaign the laying zones (coupling or laying insects) index them on a map and make the evaluation of surface areas. These laying

areas should be subject to a special surveillance at the beginning of rains. (Burkina Faso: Gana Diagne)

--- Surveys give a good indication of what strategies should be used, particularly for surveillance, equipment, and logistics. They should be conducted at the end of November or beginning of December. (Chad: Ngaromillet Michel)

1. How to best determine threshold levels for control?

- For 1988, thresholds will have to be based on experience gained in past years by SCPS and Technical Assistants. The 1987 threshold of 9 instar IV or later stages per m^2 is a good starting point. For younger hoppers, the threshold should be at least 12 instar III and 15 instar II per m^2 . Whenever possible, control should be delayed until instar III to allow for possible high natural mortality. For farmers, the practical threshold will be when damage to crops is imminent. The threshold for sedentary species in fallow and forests will depend on the potential for invasion of crops at critical times. Buffer zone treatments around crops should be considered. (Senegal: E. Huddleston)
- Crop loss analyses are needed to provide this answer. The answer will be complex and in fact may require at least a simple model to determine reliable threshold densities. (Sudan, Mali: G. A. Schaefer)
- If dealing with migratory species, threshold levels should be the same regardless of where they're found. (F. M. Philips)
- Threshold levels indicating the need for control should be developed or refined for the major pest species involved. They should take into consideration the amount of crop damage that can be tolerated and still provide food and forage for the citizens. (Chad, Niger: J. J. Drea)
- The threshold levels of population control should consider the consequences of non-control. The concept of threshold implies a damage that will occur if nothing is done. At threshold concentrations, vegetation will not be able to recover from the ravages of the grasshoppers' consumption and the grasshoppers will economically compete with humans and livestock for forage. This should be determined by research on the different environments, such as grasslands vs. shrubland, and the possibility of adult grasshoppers migrating from the area. Action should occur if the area is a sensitive habitat or if the grasshoppers are likely to move to cropland. In the U.S., the threshold usually will hover around eight grasshoppers per square yard. But, populations of O. senegalensis can produce three generations in a season. Because of that and because of capricious weather patterns, such as is frequently observed on the Sahel, we might choose to define a lower threshold. Shifting weather may abruptly create conditions favorable for an explosion in grasshopper populations. Establishing a data base over a number of years of the consequences of various levels of grasshopper concentrations under various environmental conditions is the best way to determine threshold levels. (Senegal: K. Seethaler)
- Threshold levels can vary greatly based on crop or grassland development, grasshopper species, and developmental state (instar). USDA uses 9.6 grasshoppers per m^2 as an indicator but often

ranchers are unwilling to pay the cost of treatment until populations are three or more times that level. For outbreaks, about 30 or more per m² would seem reasonable in grasslands, and for croplands any population that threatens to destroy more than about 15% to 20% of the crop. Normal insect loss in the Sahel is estimated at about 15%. (Senegal: G. E. Cavin)

- Determine threshold levels for control based on anticipated pest population levels and crop losses. Thresholds may be very rough at present until more is known about the movement of pests, factors that determine population development and collapse, and crop yields during pest infestations. Incorporate all available information into the decision making process: pest conditions in adjacent countries, weather forecasts, crop yields, best possible pest surveillance data, egg-pod counts, previous years' pest conditions, etc. (Mali: L. Yarger)
- Thresholds for grasshoppers in subsistence-level systems are not a simple calculation, but depend on the evaluation of a number of factors including available resources, relative need elsewhere, crop growth stage, insect species and growth stage, and politics. The best thing to do would be to study the case history examples, from these past two year, to try to decide where treatment was justified, where it was not, and why. These analyses can be used as a basis for discussion with other donors and for training material for country operations. (Burkina Faso: W. H. Settle)
- Two possibilities pop to mind:
 - a) set arbitrary thresholds based on a "best guess", maybe use the thresholds set in rangeland in the Western U.S. to start with. Refine these thresholds with time. This is what we did in Mauritania and it seemed to work. In reality this is what is done for the great majority of pest problems in the U. S.
 - b) begin an all-out research effort to determine thresholds. The problem with this is that the research will be conducted at certain sites, and results may have little use in other geographic locations. Also this type of project tends to take a lot of time and results are often ambiguous. (Senegal, Mauritania, the Gambia: B. Overholt)
- Egg pod surveys were abandoned in the U.S. during the 1950's because they require an immense outlay of time, travel and analysis to be accurate. You may locate the area of deposition and find the pods, but the nymphs must still find favorable conditions prevailing at hatch and early instar development before an outbreak can ensue. If there is not sufficient vegetation for the emerging nymphs to feed on, there will not be an outbreak no matter how many eggs have been oviposited. Conversely, if conditions are favorable for the emerging nymphs, there would likely be an outbreak even in the absence of heavy oviposition. A better approach would be to conduct adult surveys at the time of oviposition. The areas of heavy adult concentrations at that time would be inspected and the nymphal grasshopper population densities determined the following season. If remote sensing (by satellite) can be used to examine the ground cover

when the eggs are hatching, it too can play a role. If remote sensing must be verified by an on site inspection, a nymphal survey would also be conducted. This can be done as an ongoing routine conducted by the cooperating governments. (Senegal: K. Seethaler)

- When surveys show critical level of infestation. (Cameroon: J. Dorman and M. Lang)
- Determining density levels. (Cameroon: L. Soumare and A. Giner)
- Depends on value of crops area involved and climatic factors that will induce egg matching. (Cameroon: S. Njymian)
- In an emergency control program like the one we faced in 1986 and 1987, the objective was to protect the crops from heavy grasshopper damage. It would be impossible to control the infestation throughout the country. Thus, in practice, farmers used dust on their crops during the first half of the season when the young plants are being attacked by grasshoppers probably at densities greater than five per square meter. Extension agents using hand sprayers with liquid pesticide, were for the most part spraying crops which were heavily infested densities greater than 10 to 15 per square meter. Late-season aerial spraying was done primarily in eastern and central Chad at a time when the second and third generation grasshoppers were moving in larger numbers from the drying grasslands to the green crops. The rule of thumb adopted by the USAID/CHAD aerial control program, was to spray major cropped areas if infestations exceeded 20 per square meter. (Chad: USAID/Chad)
- Densities greater than 23 per square meter, crop phenological stage and vulnerability as well as surface area infested. (Chad: J. E. Ohabuike)
- If farmers have chemicals, they decide when to treat. Spraying should be done when densities are above 18 per square meter. Control efforts should also try to kill the first generation to prevent multiplication of populations later in the season. The season should be divided in phase I for ground control, and if populations are not controlled, in phase II aerial control should be done. (Chad: V. Diefenthaler)
- Respondents felt trials should be conducted to assess loss in plant population at seedling stage relating result to total yield loss. high and medium densities should be controlled, whereas scattered or low densities should not be treated. Systematic observations should be made by an experienced entomologist of type of plant, stage of growth, stages of development of the pest, number insects/M², number (of) infected plants, and damage inflicted on plant. Gorta suggested a yield study to observe impact on yield of infestations at various densities at various crop stages; efficiency studies to observe impact on crop yield of grasshopper control at various densities at various stages; cost benefit analysis of the above yield and efficacy work. (Sudan: GH/L Program)

- Use of foreign and national expert judgement depending on conditions Value of plants under attack, stage of plant growth, time of year, stage of insect, crop value, available resources, species involved, concern at high government levels, density, potential for migration, urgency etc. Rule of thumb considering preceding was 10/M2. Field work is needed to refine these judgements and establish more measurable criteria. (Guinea-Bissau: J. A. Franklin)
- Locust control is aimed at preventing gregarization. Threshold levels for grasshoppers are a priority more difficult to establish than for locusts. Grasshopper damage results from a complex interaction between several pest species, seasonal variations natural vegetation and cereal crops. (Mali: USAID/Bamako Technicians)
- The control threshold varies according to the state of the crops and species involved. The density per square meter is still the deciding factor. (Mali: S. Sountera)
- Depends on where and when. Theoretically, levels in crop land are different from pasture land; however, both must be continuously monitored as environmental conditions change over time. Low levels in pasture can be devastating when the pasture dries out and the grasshopper move into crops. This can happen so quickly, that pest levels in crops must be supplemented by environmental condition and pasturage monitoring. (Mauritania: W. B. Thomas)
- Damage thresholds for grasshoppers depend on vegetation conditions, bio-mass and rainfall. A zonal approach associated with vegetation types and moisture, adjusted for seasonal changes, would probably be the best approach. (Burkina Faso, Niger: C. Kelly)
- Very difficult and subjective. Concept of threshold levels is based on economics (costs of inputs, value prevented loss) which does not seem to be used in the grasshopper campaign. At this stage maybe only reliable thresholds can be determined for Oedaleus Senegalensis. Of the other species not enough is known about population dynamics. For them field observations on actual damage done to crops may be the only useful indicator at the moment. (The Gambia: A. Laurence)
- Through experience and studies. (Niger: F. Boillargeon)
- According to M.G. Popov, control thresholds are estimated at 10 insects per square meter, which should only be used as a guideline. It can be retained for use by inexperienced persons to avoid surprises. (Senegal: A. B. Ndiaye)
- This evaluation of critical level thresholds has been established by PFIFAS (letter No. 5/87) in collaboration with many Sahelian Crop Protection officials. It does not seem necessary to conduct the same studies a hundred times just for the fun of it. (Niger: M. Germaux)
- When control is free to the farmer it is important to exercise threshold levels based on chemical cost and labor cost of potential

crop loss. Environmental considerations are important. Also pest dynamics. (The Gambia: A. McKenzie)

- The control threshold or pest control process is difficult to determine, in view of the following factors:
 - extent of the infestation
 - type of infestation
 - effect on crops and rangelands
 - economy (financial impact with regard to anticipated results)
 - availability of affected plants(Mauritania: Tahara Galledou)

- -Evaluation of the egg pods per square meter
- Quantity of useful rainfall and sum of useful temperatures for egg-watching
- Estimate of density per species and per M²
- (Chad: Ngaromillet Michel)

- The thresholds limits which can allow the control can only be determined as the field. These thresholds depend on factors such as: plant and vegetable status, infested areas, insects populations density, age of insects (larvae, wings) operation economic rentability. The best decision is the one that the prospection will take cognizantly, that is to say after the determination and analysis of all factors. (Burkina Faso: Gana Diagne)

2. How to best use non-experts for surveys?

- Non-experts can be effective for survey if well supervised and if given very specific training. A pilot program in one or two Arrondissements should be funded in 1988. A good scouting program should cost less than \$0.04 per hectare. Throughout the country, full use must be made of other government agents, NGO's, and farmers. (Senegal: E. Huddleston)
- Standardized sampling systems are essential for non-expert surveys. Such systems must be specific to the pest species and vegetation in question. (Sudan: G. A. Schaefers)
- Use as part of a team supervised by an expert. (F. M. Philips)
- Appoint, train, and fund individuals from each prefect in survey and evaluation techniques. An expert from OFDA (or Foreign agency) would have to provide illustrative training materials and conduct the training in each country. (Chad: P. W. Orr)
- Non-expert personnel can be used to complete on site surveys of all stages of grasshopper development if properly trained in rudimentary grasshopper identification and if they are able to read maps. They would have to work closely with someone familiar with the program objectives. (Senegal: K. Seethaler)
- Establish village level teams trained to recognize species and stages of the pests, the importance of population counts or density indicators. These permanent village teams would have annual refresher meetings, training programs, and award ceremonies by provincial officers. (Chad: J. J. Drea)
- Non-experts can be trained rather quickly to make population estimates. Species identification, developmental stage (instar) and individual species biology is much more difficult. Non-experts should not attempt classification. They should merely make collections for referral to experts. (Senegal: G. E. Cavin)
- In-country and donor technical specialist need to develop pamphlets or flyers with pictorial sketches or photographs of various species and stages of development. These "flyers" could then be used by non-technical people assisting in the grasshopper/locust surveys and suppression activities. Training in the detection of pests and evaluation of pest population conditions seems to be a major need. Supervision of non-experts by trained experts is essential to insure accurate and timely reporting of pest conditions. (Mali: L. Yarger)
- Devise some type of "trap" or "sweeping net". Non-expert would have to kill his catch and turn it over to "expert". Expert would determine species and numbers. Data would indicate "x" number of species per unit area. (Mali: S. Tunnock)
- The key to success over the long-run will be effective survey and reporting. A pool of experienced survey personnel needs to be

continually developed. In host country operations surveyors will come and go. However, the training required to be an effective surveyor is not that difficult, therefore, training should be a perpetual activity with as many people as possible being trained. In this way, when the need arises, there will be a pool of people who can conduct reliable surveys. (Burkina Faso: W. H. Settle)

- Not sure what you mean by a "non-expert". I firmly believe that any general agricultural extension agent can be trained to conduct a valid survey. It's not that difficult. Motivation to do a good job is an entirely different problem, and is something the host country should deal with. (Senegal: J. F. Miller)
- Train them for insect identification and recognition of threshold levels. (Cameroon: J. Dorman and M. Lang)
- USAID/CHAD contracted a non-expert but with an agricultural background to assist the USAID entomologist in field surveys. The individual was trained by the entomologist and former agents from the integrated pest management project to identify the major species, estimated densities, estimate mortality rates, record and report data, and evaluate calibration of spray aircraft. The training was kept to the basic needs and dealt very little with theory. The contractor proved to be very useful. (Chad: USAID)
- Under strict supervision of experts. (Chad: J. E. Ohabuike)
- Training is possible, but must be kept simple and deal only with the basic needs. For example, it is not important to learn all the species of grasshoppers in Chad, only a few are of most importance. (Chad: V. Diefenthaler)
- Local inhabitants could be briefed to send any locust looking insect to the nearest locust control office trained locust scouts should be deployed in areas of possible breeding. Simple questionnaire forms in local languages returnable to MOA - with bagged samples of pests - should be made available. All agreed basic training on methods and techniques of survey would be. (Ethiopia: USAID)
- Symmons believes non-experts are useful for spotting gregarious infestations of locusts which are unequivocal; simple handouts and instructions would provide them with useful guidance. Nomads are also a good source of information. All Sudanese respondents believe scouts should be stationed at breeding sites (they can travel on camel-back). Local farmers, villagers and local authorities can also be a source of information perhaps by reporting to regional entomologists. One PPD person suggested local non-experts, with minimal field training, can collect data on vegetative conditions, type and state of soil, and densities of adults or hoppers seen. (Sudan: GH/L Program)
- Presumed to mean villagers (farmers). To monitor areas in/around where they work. Subject to applying some established criteria, they report perceived problems to a first level better trained, government

employee for evaluation. Probably subject by villagers to conflicting labor demands and routine travel in areas of interest and perceived sense of urgency/importance and frequency of visits by government employees. (Guinea-Bissau: J. A. Franklin)

- Non-experts are best used for sightings only; signalization as opposed to prospection. For example farmers or agricultural agents signal presence of grasshoppers to plant protection specialists follow up with field surveys. (Mali: USAID/Bamako Technicians)
- Farmers and villagers often know their land and crops best, and are often the least utilized resource. The problem is to integrate the farmer information in to control decision making. Another problem is the accuracy of such non-expert information. Thus, some training is necessary to enumerate "some" or "lots." (Mauritania: W. B. Thomas)
- Based on reports of the AID entomologist in Burkina, 2-3 week training for field personnel, with follow-up training and field oversight, can produce accurate non-specialist surveyors. (Burkina Faso/Niger: C. Kelly)
- Non-expert-farmers (should identify) location of areas with high population densities village extension workers. Population counts (numbers per m² or plant hill) (but) not specified for species. (The Gambia: A. Laurence)
- It's not possible to use non-experts for surveys. (Niger: F. Boillargeon)
- The best way is to prepare a questionnaire drafted by acridian experts. It should be as detailed as possible. (Senegal: A. B. Ndiaye)
- People on the site; i.e., the village team agents, should naturally be used to a maximum. These sources of information may be erroneous but they do have some existing merit. The supply of this information should be made easily available but be reviewed as often as possible prior to conducting any motorized or aerial operation. (Niger: M. Germaux)
- After basic training, these persons could be used as surveyors. (Burkina Faso: Peter Dettmar)
- Have them prepare individual questionnaires, or use people working in the field. (Mauritania: Tahara Galladou)
- First of all ensure their practical training before using them for these evaluations. Every signalling made by a non specialist should be accompanied by predacious samples. (Burkina Faso: Gana Diagne)
- To inform and include them at the preparatory stages of the control program. Use of radio broadcasts to inform them of the grasshopper/locust outbreaks. To provide training on simple control techniques such as density/M2, identification of species, control and

efficacy of the pesticide. Observations: time, temperature, rainfall, crop damage due to different species, the level of vegetations damage, etc. (Chad: Ngaromillet Michel)

3. What methods are needed to best predict abundance of pests and effectively transmit this information to decision makers?
- End of season adult surveys on a systematic grid are the best starting point. The PRIFAS model is the best tool available to estimate the potential; however, it must be used in conjunction with timely, systematic field surveys. A good radio network, at least to the Department level and preferably to the Arrondissement level is critical. A reporting schedule of three times per week should be adequate. The Operations Center concept should be continued. (Senegal: E. Huddleston)
 - In populated and farming areas, the National Crop Protection Service in most cases have groups of survey technicians trained and using motorcycles or other vehicles to telephone or radio back findings. Host countries should be able to cover and expand on this with perhaps some help in sufficient numbers of small vehicles, radio equipment and field expenses. With their experience, they can train additional personnel as needed. (The Gambia, Niger: C. M. Voss)
 - No simple answer. There is clearly no substitute for adequate numbers of well trained and placed scouts. Economic feasibility becomes a constraint, however. Information transmission is the key because of the need for quick responses. Depending on the country, population density, road network, etc. overland or radio transmission should be selected. Casual delivery by village scouts is usually of little use except historically. (Sudan: G. A. Schaefer)
 - Standardized survey techniques. Submit information daily via radio. (F. M. Philips)
 - Trained in-country personnel are necessary to make detection surveys. Either USG or FAO experts should determine from survey data whether control is needed. Tolerable damage levels must be established for crops and rangeland. Data analysis should include information from adjacent countries. (Chad: P. W. Orr)
 - Prediction of pests and transmission of information: Subsidize local teams at village level for surveying and scouting. This information brought to a central location where the information from several villages can be transmitted by radio to regional offices. (Chad: J. J. Drea)
 - Perhaps the only realistic method that we have available to predict the abundance of grasshoppers with any accuracy is to establish a network of survey sites and to follow a schedule for visiting each site at carefully selected intervals. The CPS should have ample resources and personnel to conduct this activity. Since spray programs are most effective before damage has occurred and before grasshoppers migrate, the timing of the surveys should be dictated by the need to establish whether the damage thresholds will be exceeded. This alerts Operations to initiate control measures to prevent the population from exceeding the damage threshold. Ideally,

the surveys would coincide with egg hatch, the nymphal instars 1-3, and an adult survey at the time of the ovipositions which result in diapause eggs. By conducting a survey at the time of egg hatch you have the first indication of the current year's population outbreak potential. An early instar survey is crucial, for that is when population densities can be estimated to determine whether or not the adult grasshoppers may reach or exceed the damage thresholds. High population areas should be resurveyed to confirm the need for control. An adult survey at the time of final oviposition will give an indication of the next year's population potential. Given the nomadic character of O. senegalensis and the association of its life history with the movement of the intertropical convergence zone, there are inherent difficulties with control program timing. It will apparently require a number of years of observation to establish a baseline.

One might establish a monitoring program by setting up a network of trained observers that report grasshopper population densities at the survey sites to the Sector Chief of the CPS who relays it to the CPS Directorate. The Directorate, in turn, would relay the information to a regional agency. In addition to population counts, the network could be used to transmit information about physical and vegetative conditions on the range. (Senegal: K. Seethaler)

- Spot checks using helicopters, trained in-country persons in villages, use of persons, remote sensing techniques, etc. Transmit information through a structured reporting system supported by in-county and donor technical specialists. Report the information to the appropriate decision-makers through a task force, steering group, etc., comprised of in-county and donor representatives. (Mali: L. Yarger)
- "Experts" from above would have to be wide-spread through out the damage zone. They would need radios to call into a central office to report population numbers and rain data. Central would update a zone map with this data, and photos from a Satellite that showed "green" grass or crops. Danger spots would have to be checked by an entomologist (on the ground) and a decision made if or when it should be treated. (Mali: S. Tunnock)
- Methods to predict abundance? -- I believe it is inappropriate to separate methods from infrastructure. I believe a fairly simple formula exists to successfully address the grasshopper problem. What is needed is for each country to be sure to have a sufficient number of well trained ground survey teams, equipped to cover the country and be able to report their finding to decision-makers. The distribution of equipment, supplies and authority must be decentralized, as was done in Burkina. In addition, as improvements are made on weather monitoring and reporting, this information can be integrated with the pest reports and some headway might be made toward a predictive data base. (Burkina Faso: W. H. Settle)
- Predict? Not sure what you're referring to. Prediction within one growing season or from one season to the next? I don't feel that survey should be aimed at prediction, but rather on what is going on

at the time of the survey. An infrastructure is needed to transmit this information from the scouts to the decision-makers. In some situations scout (team leaders) have the authority to make the control decisions, and have the capacity to implement these decisions, (which is certainly the most effective method in my mind). In others, information will be transmitted to the capital or a regional center where some honcho will decide on where, when, and how to intervene. I think this is a very inefficient system. The type of system for transmission of survey results will depend on the country. In some, SSB radios are needed, while in other more developed countries, the local telephone system may suffice. (Senegal: J. F. Miller)

- Permanent surveying with a good radio communication system. (Cameroon: S. Njymian)
- Information based on extension agents personal observations, survey data, and information gathered from farmers must be transmitted by radio to a central location like the crop protection office in the capital city. (Chad: USAID)
- One respondent suggested that an improved DLCO/EA and improved public awareness are what is needed to best predict abundance of pests. Also, foot traverse, vehicle traverse, low-flying and counting the number of locusts flashing were recommended/ finally, by quantitative and qualitative survey of pests. The conclusions from the surveys could be transmitted to decision-makers. (Ethiopia: USAID)
- Respondents felt that the careful recording of environmental changes and climatic conditions and relating such information to circumstances in previous years will help in drawing conclusions which can then be translated to decision-makers. All information should be transmitted by radio from field to the Region entomologists. (Sudan: GH/L. program)
- The only proven method is to have an adequate number of trained agents in the field throughout the year. These agents should have a coherent system of reporting to decision-makers. Decision-makers should be spread jointly between field level and centralized administrative managers. (Mali: USAID/Bamako Technicians)
- Infestation potential and ecologic conditions are the principal forecasting criteria. The radio remains the best means of transmitting information. (Mali: S. Sountera)
- Crop Protection Service personnel in the field working with trained non-experts linked to control decision-makers by radio. Along with the information the field workers have access to locally, they should also be supplied with the latest satellite greenness map information, so as to know that areas are greening up. Field workers should also have the results of the area egg-pod survey, so as to watch for hot spots. (Mauritania: W. B. Thomas)

- The AGRHYMET model for predicting grasshopper densities appears to be suited for monitoring conditions if adequate field data (rainfall, vegetation conditions) can be transmitted from the field. In the case of Niger, an FAO/UNDP project will establish an early warning system over the next 18 months using this model.
- The value of the PRIFAS model is not clear at this time. The process by which data is collected in Niamey (at AGRHYMET), transmitted to France and then disseminated via mailings means the model's information is often too late for use in the field. In addition, the USAID/Burkina TDY entomologist indicated there are technical problems with the PRIFAS model which may limit its effectiveness.
- The procedures for reporting vary between and within countries. Communications plans should be developed specifically for each country.
- Training is also necessary to enable crop protection personnel to use the output of models and collect accurate and useful data for use in the analysis. The field collection of data on grasshoppers is an area where special attention to training is necessary, as skill at the local level is critical to accurate reporting and effective early warning of potential grasshopper programs. (Burkina Faso, Niger: C. Kelly)
- ANTICIPATIONS: Egg laying OBSERVATIONS made during the precedent months of September and October should be referred to.
- The enumeration of Oothecas twins is too delicate to be set up as a reliable method capable of being generalized.
- This leaves observation (insect surveys): The observation and the enumeration of insects and especially of larvae should be done as soon as the invasion appears.
- Concerning the transmission of required information, sightings should be transmitted as soon as possible to the Arrondissement level. The Administrative Posts' agricultural officials should thus be provided with a least one mobylette, and the Arrondissements should be provided with at least one or two vehicles. (Niger: M. Germaux)
- Training of scouts with in-field back-up by experts. Decision making by CPS/TA's in a technical meeting. (The Gambia: A. McKenzie)
- Ensure prospections
 Transmit rapidly information collected with recommendations at decision centers
 Proceed to a control of all signalling made by a non specialist (peasants, breeders, etc.) and make evaluation of infested areas before transmitting information. In order to be efficient prospecting teams must be equipped with walkie talkies which will allow them to transmit the signalling collected without being obliged to go back to their working place. (Burkina Faso: Gana Diagne)
- Meteorological information
 Food (vegetation)
 Residual population survey and survival conditions
 Residual population survey and egg pod surveys for those insects in embryonic diapause. (Mauritania: Tahara Galledou)

--- At the ~~minimum~~ ensure continuous surveillance of at risk areas; the survey teams should have two-way radios so that they can be in constant touch with decision-makers. (Burkina Faso: Peter Dettmar)

- Egg pod research
 - predicting climate data
 - assessment of the past control program

4. How valuable are helicopters for survey purposes?

- Helicopters are needed when the area to be surveyed exceeds the capacity of ground surveyors; however, their use should be reserved until all ground possibilities are exhausted. The value of a helicopter is to prevent incipient outbreaks from going undetected. It must be remembered that a helicopter is a biased sampling tool that will always over-estimate the area infested because each stop tends to be made in an area of highest potential infestation. (Senegal: E. Huddleston)
- From all observations and discussions with crop protection personnel and entomologists, the helicopter, properly scheduled, was a vehicle that fit perfectly into the spotting of grasshopper-locust infestations. It's use was more economically feasible where roads were not readily available. It would be impossible, given the time constraints, for ground surveying to accomplish the same results except at a greater cost of large numbers of men and equipment.
- The ability of the helicopter to land in any area contributes to the accuracy and speed of this method. It would be important for the survey helicopter to also work with any airplane spray group in order to keep them productively on proper targets. Of course, any helicopter should have spray equipment in country to attach and assist in spraying if needed. (The Gambia, Niger: C. M. Voss)
- Very valuable. Dr. Philips would not have been able to complete field surveys without the helicopters. In 1986 we used the Senegalese Air Force, 1987 a U.S. contractor. The alternative of having efficient field personnel (trained) with adequate ground transportation and gasoline was not viable in 86 and 87, in Senegal, Mali and Burkina Faso - that I am aware of. (Senegal, Mali, Burkina Faso: R. G. Adams)
- In my opinion there is no substitute for helicopters. In fact they would be essential for scouting such species as African Migratory in areas such as the Niger Delta in Mali. They may pinpoint possible oviposition sites. (Sudan, Mali: G. A. Schaefers)
- Very valuable, particularly when dealing with migratory species in remote areas. More area covered, more efficient. (F. M. Philips)
- Helicopters and/or light fixed-wing STOL aircraft are essential to cover the vast area involved. Aircraft provides better transportation than camels, Toyotas, donkeys, or mobylettes! (Chad: P. W. Orr)
- Helicopters are most useful in remote areas that are not readily accessible by alternative land transportation. In very remote or difficult terrain they may represent the only practical method for on site inspection. The major drawbacks are that they are very expensive to operate, they require extensive maintenance, they may not always be reliable under extreme environmental conditions, and their use requires a lot of advance planning and long ferry distances. (Senegal: K. Seethaler)

- Expensive but excellent for surveying remote areas or when rapid survey is required over larger areas, using grid type survey system. Delimiting of areas detected in aerial grid surveys should to the extent possible be accomplished by ground parties with varied expertise. (Senegal: G. E. Cavin)
- Helicopters are very valuable in a country like Mali for entomologists to get to the danger spots above to make decisions. However, gas is hard to find and transport. Small, fuel efficient copters are needed, or Cessna 170's or 180's with big tires might work. These planes can fly 6 or 7 hours with big fuel tanks on them. Perhaps one of our jumbo cargo planes could air-drop fuel at strategic airports. (Mali: S. Tunnock)
- Very valuable for outbreak situations, but far too expensive for non-outbreak years. (Burkina Faso: W. H. Settle)
- Not in Cameroon. (Cameroon: J. Dorman and M. Lang)
- Helicopters are very valuable. In 1986, the Lake Chad area was surveyed by an OFDA team in less than five hours and was able to still the rumor that an African migratory locust infestation was growing rapidly. However, helicopters need much logistical support. The pilots must work with qualified entomologists and must be given full support and precise guidance daily as to where they will work. The importance of providing this support and guidance as well as timely provision of services was clearly demonstrated in this year's ineffective use of helicopters. Another donor provided a small helicopter very early in the season to survey for grasshoppers in support of ground control operations. Unfortunately, the limited flying time quickly ran out and the helicopter was not available to survey at a more critical time of the season as grasshoppers started multiplying rapidly. In addition, the second helicopter provided for locust survey and control in October would have been much more useful had there been better logistical support and direction. This helicopter was required to ferry nearly 400 kilometers daily between its only base in Abeche and the infestation sites, which limited its time available to survey and treat. (Chad: USAID)
- Very useful particularly between end of June to early October. (Chad: J. E. Ohabuike)
- Helicopters are a valuable resource for rapid prospecting. However, the effective use of helicopters depends upon several key factors. Our experience demonstrated that pilots and support personnel must have: (1) local language, (2) experience with helicopter operations in remote areas; (3) in cases where helicopters will be used for treatment, pilots should have had experience in treatment programs. Our experience during past campaigns (1986, 1987) showed the piston engine bell 47 helicopters were superior to the Jet Ranger Turbine helicopters for grasshopper work. (Mali: USAID/Bamako Technicians)

- Helicopters are important for surveying, but this work should be supplemented by land surveys. (Mali: S. Sountera)
- Not important. (Niger: F. Boillargeon)
- Helicopters do not seem indispensable. Crop Protection Services should use means available to them; vehicles, radios, aircraft, etc. They should also work according to THEIR AVAILABLE MEANS - that is why it seems that a systematic use of a helicopter should not be recommended. Independence (of the national CPS) should above all be preserved. (Niger: M. Germaux)
- Helicopters surely constitute an important means for evaluation, inspection and travel within otherwise inaccessible areas. (Burkina Faso: Peter Dettmar)
- In Chad this requires: sufficient numbers, good logistics, information. (Chad: Ngaromillet Michel)
- The helicopter is very important for surveying, especially since landings are easily made in susceptible areas. (Anonymous)
- Helicopter is important for prospecting and evaluation. Besides it allows the access to inaccessible zones (flooded, enclosed rocky zones, etc.) it also allows the rapid execution of this evaluation. (Burkina Faso: Gana Diagne)

5. How best can remote sensing end products be used for pest surveying?
- The remote sensing end products are best used to plan survey routes and degree of intensity of surveying. The maps are most important in early season; however, they are needed weekly with no delay in delivery. The maps may also be valuable near the end of the season to help assure areas of high potential egg laying are checked. (Senegal: E. Huddleston)
 - We needed a higher, more significant degree of "ground truth" in order to correlate field conditions and hatches. This should come with time and experience. (Senegal: R. G. Adams)
 - May help to pinpoint oviposition sites. (Sudan: G. A. Schaefers)
 - The greenery survey would be particularly useful if maps were available within 4-7 days of the time photos are taken. (F. M. Philips)
 - Remote sensing end products are valuable tools to identify and stratify areas where potential suppression projects may be needed. (Chad: P. W. Orr)
 - If models for egg hatch exist, remote sites that monitor prevailing weather, coupled with satellite images of general weather patterns, can be utilized to predict when conditions are favorable for egg hatch. This information could be used to select sites for special surveys. (Senegal: K. Seethaler)
 - Detection of potential breeding sites in remote areas. (Senegal: G. E. Cavin)
 - Remote sensing end products can be used to stratify areas based on pest populations and crop conditions where suppression strategies should be implemented. (Mali: L. Yarger)
 - See Bryceson, K.P. and D.E. Wright. 1986. "An analysis of the 1984 locust plague in Australia using multitemporal landsat multispectral data and a simulation model of locust development." Agriculture, Ecosystems and Environment 16(2):87-102. (Burkina Faso: W. H. Settle)
 - Communicate results to the specialized organizations, such as FAO and PRIFAS. (Cameroon: S. Njymian)
 - In Chad, the satellite imagery was interpreted by USAID technical staff and discussed with survey/control teams. Areas with habitats most likely to be infested were identified and transposed to regular 1/250,000 scale maps which were given to the survey teams. This procedure has given survey/control teams an additional tool which can give better direction for where they need to be working. (Chad: USAID)

- By correlating previous zones of heavy infestations with color indicies on the maps and confirming these by aerial/helicopter surveys as basis for future strategy. (Chad: J. E. Ohabuike)
- The remote sensing end products can best be used for pest surveying for identification of the vegetation index and the meteorological conditions convergence and rainfall. The end products can be used as a guide as to where and when to carry out locust surveys. (Ethiopia: USAID)
- Two people failed to answer the question. Of those who did, one thought remote sensing is of no use except for rainfall and green areas. Even this, he said, is still in the experimental/developmental stages. Four people thought remote sensing is very valuable in providing a good picture of prevailing ecological conditions which combined with historical knowledge of desert locust breeding areas will enable survey units to go directly to the right areas. (Sudan: GH/L Program)
- We currently doubt its utility in Guinea-Bissau since rainfall is higher and more frequent over larger areas (proportionally) of Guinea-Bissau than in the Sahel. Have high altitude NASA U-2 surveys been considered? (Guinea-Bissau: J. A. Franklin)
- Remote sensing end products can provide basic data on vegetation distribution and soil types and for mapping crop areas. It has no proven value for real time monitoring of pest populations or damage to our knowledge. (Mali: USAID/Bamako Technicians)
- The NOAA satellite greenness maps are an extremely useful remote sensing end products for pest surveying, among other uses, in Mauritania. The product was very well received by the Ministry of Rural Development, Crop Protection Service, and field workers. Its format is easy to understand, and is readily accepted as a pest survey tool. Such a resource is very important in a country like Mauritania where harsh environmental conditions make both ground and aerial survey efforts difficult and often impossible. However, in order to fully realize the usefulness of remote sensing end products, these products must be timely. It is important that the maps be in the hands of those utilizing them within days of the actual data sensing. (Mauritania: W. B. Thomas)
- Given the rapid transmission of imagery to the field, hard copies at a scale of no more than 1:500,000 (1:200,000 preferable) should be provided to field agents on a timely basis for use in targeting field surveys to vulnerable areas. (Burkina Faso: C. Kelly)
- Not useful in The Gambia. (The Gambia: A. Laurence)
- Since there is a close correlation between green spots and the insects, surveying zones are reduced. (Senegal: A. B. Ndiaye)
- Not of value in such a small country and where there are, on the whole, not migrating species. Plus they are extremely expensive.

(The Gambia: A. McKenzie)

- Since there is a delay in transmitting remote sensing results, and the ravager does not stay in one place, the application of these results for pest surveying is especially important because they indicate the green zones capable of containing these ravagers. As for the numbers of the ravager and the effect on plant cover, these results are not easily applicable. Only land inspection can furnish this information. (Mauritania: Tahara Galledou)
- To determine the relationship between the index and signalization data. Relationship index (soil/vegetation/outbreak and climatic data. (Chad: Ngaromillet Michel)
- A daily working session should gather in the afternoon, as a responsibility of the control unit with all its present technicians and prospectors in order to: make out the day's operation; program the next day operation; and take all possible decision as far as the control of some signalling is concerned. (Burkina Faso: Gana Diagne)

1. Under what circumstances should pests be controlled on croplands, rangelands, and unutilized lands?
 - When insects reach critical density and crops are threatened. (Cameroon: J. Dorman and M. Lang)
 - If infestations threaten to destroy valuable range grasses and crops, then they should be sprayed wherever they are found. If the infestations are scattered and in small pockets, then ground control would be most appropriate. Larger widespread infestations would require aerial control. (Chad: USAID)
 - If number and areas infested are high. If they are causing or are likely to cause significant damage. The stage of development of pest. Social and political considerations may play a role. (Chad: J.E. Ohabvike)
 - If infestation is heavy, then they should be sprayed even in rangelands to keep populations from multiplying and attacking crops. (Chad: V.Diefenthaler)
 - Crops should not be mature; non-persistent chemicals should be measured to avoid scorching. Pests should be controlled when they pose a danger to the ecological environment/crop production; cropland when the pests represent a threatened loss of productivity greater than that represented by inaction; rangeland and unutilized land could be decided by experts as to when the control operation should commence (subjective decision). (Ethiopia: USAID)
 - Almost everyone agrees that control depends on densities recorded in infested areas. Croplands, especially at late stages of plant development and rangelands should be avoided but, if necessary, bait and insecticides with less toxicity can be used. Unutilized lands should be treated with ULV insecticides. Symmons believes locusts should be controlled wherever they are and grasshoppers only in crops where the threshold (which has not been defined) has been exceeded. One person from the PPD said they should be controlled, "when they become a plague." (Sudan: GH/L Program)
 - **Cropland** - Here, pest should should be controlled when they reach a population level that threaten crop production. **Rangeland** - In this case, this is a much larger system, where large scale pest control is often costly and can affect non-target organisms. **Unutilized** - As with above, but often necessary to protect crops. (Mauritania: W.B. Thomas)
 - Given the limited means for survey and control available in Niger and Burkina, all grasshopper infestations above an established threshold for vegetation type should be treated. The major problem faced each year is the late season migration of grasshoppers from pasture to crops. This event may be localized, but usually occurs too fast to permit effective treatment, even by aerial application. If this

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approach cannot be implemented, a relatively high level of pest damage must be accepted. If the general control strategy is used, more efficient and less environmentally dangerous pesticides are required. (Burkina Faso, Niger: C. Kelly)

- If crops show signs of attack, [then control pest]. If populations are extremely high and danger risk for migration into crop lands (for areas bordering cropland). If these grounds appear to be oviposition sites with high ovipositing population. (The Gambia: A. Laurence)
- If it is a breeding area, the rangelands can be protected, but, for insects invading the crops after the rangelands, barrier sprayings should be done. (Niger: F.Boillargeon)
- This involves an estimation of future damages caused by predators in relation to the cost of control. Several other factors - human, biological, economic - should also be taken into consideration in order to determine whether control be undertaken. (Niger: M. Germaux)
- Protection of crops should be of the highest priority with the most attention given to the critical time when the millet is very small. OSE infestations on rangeland, fallows, and forests should be controlled whenever possible to try to manage OSE on a national basis. Other species on noncultivated land should be controlled only when damage to crops is a distinct possibility. (Senegal: E. Huddleston)
- It would appear to me that the important control techniques should be to save the croplands; in which case, targeted treatments to those areas may be sufficient. These areas should have ready access to ground treatment methods. This may work better for grasshopper or non-migratory species. In the case of migratory or desert locusts, if conditions favor the hatch and population increase, then they should be attacked in breeding areas, or range land and unutilized land. Otherwise, they may reach croplands in such numbers that crop treatments alone will not hold them. (Niger, The Gambia: C.M. Voss)
- When they threaten to become a humanitarian impact, i.e. when the "haves" will need to assist the "have nots". Also, at favorable points in the political arena. (Senegal, Mali, Burkina Faso: R.G. Adams)
- Pests should be controlled on croplands whenever they are present in excess of an economic threshold, unless total loss is imminent. Similarly thresholds should be determined for rangelands. If below threshold on rangeland or unutilized lands, control should be initiated if they pose a threat to croplands or if breeding foci are localized in such areas. (Sudan, Mali: G.A. Schaefers)
- When dealing with migratory and multivoltine species, treat whenever threshold is reached in each instance. (Senegal, Morocco: F.M. Philips)

- Pests should be controlled on crops and rangelands when evaluations show an increase in pest populations that could seriously affect the productivity of the lands in question. Control pests on wildland only when evaluations show a positive threat to productive crops and rangelands. (Chad: P.W. Orr)
- Grasshopper control should be approached on an area wide basis. Cropland cannot be effectively isolated when grasshopper migration occurs. This is especially true of O. senegalensis which seems to have acquired a taste for millet equal to that of range vegetation. Productive rangeland is often used by both settled and nomadic farmers. This resource should be protected when heavy populations of grasshoppers occur. Unused lands should also be subjected to control only when the area serves as a reservoir for grasshoppers. It, of course, makes no sense to spray where there are no grasshoppers or where they have already done their damage. (Senegal: K. Seethaler)
- Croplands: controls to be applied when crop is being damaged or when there is a population building up to damage level on crops.
Rangeland: controls to be applied when pest populations are increasing to an economic level, and where adjacent crops are threatened by invasion from rangelands.
Unutilized lands: when population is building up to a level that would threaten adjacent rangeland and/or crops due to migration. Also control on unutilized lands if population of pest represents a potential threat for the following season.
Basically crops and rangelands must be protected from severe damage. Unutilized lands must be considered as sources of pest that could threaten crops and rangeland. (Chad, Niger: J.J. Drea)
- In outbreak situations control should be undertaken wherever threshold populations of migratory grasshoppers occur or the gregarious phase has been reached. In less than outbreak conditions cropland only should be treated by individual farmers based on his or her determination as to need. (Senegal: G.E. Cavin)
- Pests should be controlled on croplands when unacceptable levels of crop damage or loss is imminent; on rangelands when range resources are threatened and unacceptable levels of resource loss is imminent; and on unutilized lands only when the (economic) values of croplands or rangelands are threatened. (Mali: L. Yarger)
- There should be two thresholds set, one for croplands, and one for rangeland. Early efforts should be aimed at controlling hoppers in rangeland adjacent to croplands. This could be called the "barrier approach" Somewhere in the range of 100 meters to a few kilometers would be reasonable. When hoppers begin invading croplands the threshold will be lowered. (No Source)
- Treat crops and rangelands if they are threatened. Avoid treating them if it is not necessary, since the products used do not last long. (Mauritania: Tahara Galledou)

--- The economic threshold point of insect damage that will require intervention. Cost of production does not exceed expected benefits of the crop production. General outbreaks which move from one country to another. (Chad: Ngaromillet Michel)

--- Depending on the crops evaluation, the age and densities of insects we should take the decision of proceeding to treatment operations.

Grazing grounds and fallow grounds constitute a nest for locusts. A decision to intervene shall be taken in these areas following the existing insects population (densities and surface areas) crops proximity and especially the degree of desiccation of these grazing grounds (we know that insects migrate towards crops when weeds wither or when they have been hoed). (Burkina Faso: Gana Diagne)

--- Cultivated fields: according to crop growth stage and population density of pests.

Range and fallow lands: according to pests population densities. (Burkina Faso: Peter Dettmar)

2. How should different control techniques be used based on species, etc.?
- Larvae can be controlled with poisoned bait. This, in fact, was demonstrated successfully by USAID to farmers in eastern Chad. Adult grasshoppers and locusts should be controlled with both poisoned bait and spraying of liquid pesticides. (Chad: USAID)
 - Control of hopper bands in cultivated fields by peasants. In large uncultivated fields, treatment by national teams. Aerial operations only on very large scale infestations, primarily against adults to prevent migrations. (Chad: J.E. Ohabvike)
 - Basically the methods of control are the same but the method of pesticide application varies depending on the extent of infestation. Techniques for control of hopper band and swarms of desert locust: large area under hoppers by aerial spraying, small bands by ground control. New hatchings and egg-fields: large area by barrier spraying; swarms by aerial spraying air to air or air to ground. (Ethiopia: USAID)
 - For hoppers, ground ULV or EC, and/or baiting/dusting techniques should be used, but for adults aerial application of ULV formulation is preferable. Others advocated an integrated approach for all species of locusts and grasshoppers. Symmons has doubts about the efficacy of baiting/dusting for grasshoppers but other methods require relatively expensive equipment. (Sudan: GH/L Program)
 - Dependent on species, stage, resources available, urgency. Know impact of technique (if applied), environmental/safety issues, extent of area affected, and cost. (Guinea-Bissau: J. A. Franklin)
 - The most important consideration is to maintain a flexible response and an operational approach. The Malian CPS is familiar with the basic hierarchy of treatment possibilities: farmer based dusting or spraying, ground spraying, targeted aerial spraying, as well as poison bait and the possibilities of biological control and changing cultural practices. Techniques must be adapted to local conditions, e.g. in some areas of Mali, village brigades are possible. In others, they are difficult to organize for sociological reasons. Training of agents could include sample problem solving in choosing treatment to suit the particular situation. One must note, however, that the practical reality is often the need to use whatever means is available at the time. (Mali: Bamako technicians)
 - Control techniques are more determined by crop and type of vegetation than by species (at least in situation with non-migrating species):
 - young upland crops: dusts, EC (backpack equipment)
 - older, taller crops: EC, ULV (backpack, ULVA)
 - older, short crops: EC, ULV (backpack, ULVA, vehicle mounted)
 - rice with standing water: If to be entered on foot: EC, ULV (backpack); if too wet: ULV (aerial)

- bush: ULV (vehicle mounted, aerial) or EC/ULV (backpack) (The Gambia: A. Laurence)

- For O. senegalensis, which moves over great distances, quick intervention is necessary. But for the other species of grasshoppers, nearly all nonmigrant, land methods can be used, since they are found there at nearly all stages of development. (Niger: F.Boillargeon)
- Techniques vary according to the insect: Control methods naturally vary in terms of the species and whether control is targeted against the larva only or adults only or larva and adults - according to the degree of the attack (Oedalaus - all grasshoppers) - In any case, the treatment of insects to protect crops is don't wait until damage is done. (Niger: M. Germaux)
- Control technique depends on crop form (height/age, density, type) and pest location in crop (leaf, ground, stem,etc), so (these factors) must be investigated. (The Gambia: A. Mckenzie)
- In every case, ground treatment should be given the highest priority. Because of cost and the speed of treatment, every effort should be made to replace dusts with ULV techniques at all levels. Area treatment should be used for O. senegalensis while buffer zone treatment should be the first choice for non-migratory species. (Senegal: E. Huddleston)
- Nosema virus is mentioned as a biological control and requires testing. Tests on grasshoppers in the U.S. could be done at less cost than in Africa. When demonstrated that it can handle a fair sized population, then it could be tried in Africa. The USDA has been testing a virus for many years against the forest gypsy moth caterpillar. They have also been working with a pheromone to confuse the male moths as well as testing the irradiation sterilizing technique. These biological procedures all showed promise against small or light infestations in new areas, but were not potent enough to check the heavy damaging populations. This may be a similar situation with attempts at biological control on the grasshopper. However, research should not be discontinued along these lines. (Niger, The Gambia: C.M. Voss)
- The biggest difference is whether the control technique is being utilized to block development of the migratory phase or just to reduce endemic levels of non-migratory species below threshold levels. Books could be written on this subject. (Sudan, Mali: G.A. Schaefers)
- Large remote areas by air. Croplands by ground equipment. (Senegal, Morocco: F.M. Philips)
- Chemical or biological control techniques depend upon target species. Pesticide application timing varies with pest species. (Chad: P.W. Orr)

- Bait formulation and spreading by farmers can be effective in some localities to control grasshopper populations that are confined to limited areas. The use of baits, usually 1% insecticide by weight, was popular during many of the early years of grasshopper control programs in the U.S. It requires that farmer organizations coordinate the mixing, distribution and application of the bait. Bait has several advantages including low toxicity, long life in the field after application, and ease of handling. The bait can be made attractive to many species by the addition of by products of agricultural activities such as fruit pulp or molasses. The carrier can be bran or even sawdust. In the U.S. we commonly use wheat bran, but rice bran might serve as a viable alternative in the infested countries. (Senegal: K. Seethaler)
- Aerial sprays should be used for large scale treatments for mass migrations or massive infestations by locusts. Ground equipment appears to be adequately effective localized infestations at the village level. The use of air application would be for back up applications, large areas of unutilized or range land, or emergency situations. (Chad, Niger: J.J. Drea)
- Timing of application based on species biology is most important. Aerial application is generally essential for treatment of gregarious or migratory populations and treatment of remote areas regardless of species. Localized infestations or more sedentary species, particularly in cropland, can normally be handled through local farmer treatment with assistance as needed by the CPS or Extension Service. (Senegal: G.E. Cavin)
- Control techniques should be keyed into the biology of the pest species and the information known about the pest. Selection of a pesticide, or other control strategy, should be based on efficacy data and consideration of environmental concern, as well as cost effectiveness. (Mali: L. Yarger)
- Control techniques differ either it is grasshopper or locust.
- Desert locust, migration locust or red locust have an era of reproduction (prediction area) and an invasion area. This we noted during 1987 campaign that desert locusts have multiplied in East Africa (Sudan, Ethiopia), after passing North of Chad and North of Niger they advanced towards North East of Africa and invaded Morocco in October-November 1987.

This migration scheme had already been identified in 1968 by means of of radars thanks to FAO/OCLALAV/COPR (Center for Overseas Pest Research de Londres) collaboration.

The most efficient control against these locusts consists in covering a regular surveillance of predilection areas where invasions are killed in the bud, infestations being subject to treatments since the larval gregarious status. It is to be noticed that locusts show two phases with totally different behavior:

-a solitary phase, where the insect in low density is practically harmless;

-a gregarious phase, where the insects density becoming important, with the interaction at the level of larval populations, insects change their behavior and can come to invasion.

(iii) Grasshoppers control whether be its species is invested with three complementary forms:

- control by peasants previously trained.

This control may assume various forms:

Early signalling by peasants, peasants organizations to control grasshoppers in grazing grounds and fallow grounds, chemical control by means of spraying bags; this control is especially efficient during the campaign first stages.

-Land interventions by the Crop Protection Services by means of portable back pack sprayers dusters or of portable trailer sprayers.

-Control by aerial means is necessary when the agricultural campaign is well advanced, the insects populations having reached their climax and that infested surfaces are very important all of which justifying such an intervention. (Burkina Faso: Gana Diagne)

--- Depends on the biology of the species, efficiency of control measures. (Chad: Ngaromillet Michel)

--- In all cases, care must be taken to protect the crops and not to harm the environment. For whatever species, ecological conditions of the environment and the behavior of the particular species should be taken into consideration. (Mauritania: Tahara Galledou)

3. What non-chemical methods for control need further research?
- Biological insecticides -- parasites, Nosemia locusta, and insect growth regulators. (Ethiopia: USAID)
 - Further research on scaring devices, sterilization techniques, light traps, ultra-sonic devices, resistant varieties (crops), and crop management. (Sudan: GH/L Program)
 - Many species in West Africa are not well enough studied in various environments for a response to be made to this question. Bio studies may give some answers. Review old U.S. literature (1800s to 1940s) for methods. However, size, soils, and remoteness of some areas may preclude many methods. Would look also at possible biological control (pathogens) that are known and test against different species in Africa to determine possible sensitivity of populations in differing environments. Also conduct search in Africa for possibly unknown pathogens/parasites. Contact USDA/APHIS (Phoenix, AZ), USDA/ARS (Bozeman, MT), and Boyce Thompson (Cornell University) for possibilities. (Guinea-Bissau: J. A. Franklin)
 - All non-chemical methods for control should be the subject for active research with particular emphasis on microbial agents. Non-chemical control in our view should be used in conjunction with limited targeted, chemical control programs, i.e. spraying, dusting, poison baits. (Mali: USAID/Bamako technicians)
 - Disease and parasitism, along with cultural alteration of growing techniques and planting time. The latter two should be difficult to implement in a traditional rain-fed agricultural system. (Mauritania: W.B. Thomas)
 - Biologic control such as the use of grasshopper parasites, particularly for large scale control of grasshoppers in mixed vegetation land use systems, should be considered as an alternative to the use of chemical pesticides. The ability of this type of control method to keep grasshopper populations over a large area below the level which can cause economic damage will save money and reduce the use of pesticides. Natural pesticides or repellents, such as the Neem extract being tested under the AFR/TR funded study by the University of Minnesota, could also be developed by use at the level of the individual farmer for the control of local pest damage. (Burkina Faso, Niger: C. Kelly)
 - Agricultural hygiene, consisting of having clean fields without weeds. (Niger: F.Boillargeon)
 - The non-chemical method with the most potential is a better understanding of the potential damage from each grasshopper species under a range of environmental conditions. Weed control in crops appears to help reduce crop damage. (Senegal: E. Huddleston)
 - Host plant resistance with species such as Zonocerus variegatus. Otherwise, research on Nosema and its spread via migrating swarms

should be encouraged. Other pathogens, parasites and predators, autocidal or genetic methods, etc., all deserve investigation. (J.A. Henderson)

- The most promising are the Nosema sp. intestinal parasites. Much research remains to be done since no good technique exists for production of the quantities required for effective control. Another problem is that control is not immediate and usually does not occur until after most of the damage has been done. Currently, there is no effective non-chemical control available. Intestinal parasite control remains an option that will require further research into finding both an agent and a reliable method of application. (Senegal: K. Seethaler)
- Entomopox virus warrants serious examination, while Nosema has shown little promise. Neem kernel extract also deserves attention and support for research. Also any of the latest generation of "hormonal analog" pesticides. (Burkina Faso: W.H. Settle)
- Control methods: Should be integrated: Biology, agronomic and perhaps mechanical. (Chad: Ngaromillet Michel)
- -illuminated trapping
 - biological control
 - pheromones
 - all other traditional control measures(Mauritania: Tahara Galledou)
- To our knowledge no predator known against locusts and grasshoppers being able to recommend the pursuit of researches for biological control.
- Infested areas by locusts and grasshoppers are the most disadvantaged from a climatic point of view do not even allow the recommendation of new cultural practices (for example to forward or to delay the sowing dates) for we do not control irrigation water.
- The only possible recommendations at this phase are: training of peasants, their organization in intervention groups which may proceed very early to signaling, to fallow grounds clearing around fields and to early treatments and in the fields and the fallow grounds.
Burkina Faso: Gana Diagne

4. a. what continuing role should host countries play in the pest control process?
- Training, monitoring, and treatment. Cameroon: J. Dorman and M. Lang
 - Supply their contributions in manpower, financing and equipment. Burkina Faso, Niger: C. Kelly
 - Be closely associated with plans and decision-making. Cameroon: S. Njymian
 - The host government should be the focal point for the control center. It should establish and chair the donor coordination and the technical committees. It should provide all personnel except technical assistance needed to carry out the project. In addition, it should ensure immediate customs clearance of all emergency commodities provided by donors. Chad: USAID
 - Pest control is first and foremost the responsibility of the host country. It should examine its budget for sufficient funds to this effect and seek supplementary funding if needed. Ensure availability of well-trained personnel, functional equipment, and infrastructure. A strong and competent crop protection service is of course a "sine qua non" to the success of the host government. All efforts must be made towards its achievement. Chad: J.E. Ohavike
 - Host countries should identify needs early; do not wait. They should have early meetings to assess situation and make decisions. Chad: V.Diefenthaler
 - Survey and control of first outbreak: (1) provide ground logistics and pesticides; (2) ground control as appropriate; (3) overall responsibility and coordination where applicable; and organization of available resources, surveying and coordination of pest-control activities. Ethiopia: USAID
 - Proper monitoring, timely reporting and good organization of control campaign. National units need to be created/strengthened and will need continuing support in long term (locusts). Grasshoppers should also be part of strengthening plant protection services, provide control campaign with technical staff, running costs, transport of pesticides and spraying equipment. The general consensus is that external resources should be deployed whenever an outbreak of pests occurs which the PPO can't cope with. In these cases, pesticides, aircraft, and transport facilities are needed. Sudan: GHL Program
 - Actively lead, assume responsibility, provide best people, coordinate donor resources, provide annual budget/resources, show active interest and visible support at high government levels, keep donors informed by providing periodic written status report (bi-weekly, annual). Guinea-Bissau: J. A. Franklin

- We see the local host country crop protection service as the primary instrument for all pest management. The grasshopper program represented an activity beyond the present management capabilities of CPS. The CPS's continuing role after donor emergency funds are withdrawn should be aimed at strengthening the institutional capacity to reduce pest build-ups, thereby mitigating some emergency operations. Mali: USAID/Bamako technicians
- The host countries should have political free will in matters of crop protection. Mali: S. Sountera
- The host country, ideally, should be at the forefront of the control effort. No matter what role they are playing at the moment, donor organizations should orient aid project toward training and self-reliance. Mauritania: W.B. Thomas
- The national Crop Protection Services should run the pest control effort. Burkina Faso, Niger: C. Kelly
- Training of CPS staff, equipment, pesticide safety and application, protective clothing. The Gambia: A. Mckenzie
- Host countries must play the lead role in the pest control process. They will need financial support and training, especially in management and accountability of resources. Senegal: E. Huddleston
- Host countries should, and in most cases do, maintain an effective national crop protection service with technicians that can assist donor countries when a locust plague strikes. Niger, The Gambia: C.M. Voss
- Training of local CPS agencies toward self sufficiency. Senegal, Mali, Burkina Faso: R.G. Adams
- Host countries should clearly be involved in survey and ground control operations and contribute to the informational network for international campaigns. J.A. Henderson
- Survey and control where resources are available. Senegal, Morocco: F.M. Philips
- Host countries should be encouraged and financed to train their people in pest management techniques. Host countries should also attempt to plan for future catastrophies. Chad: P.W. Orr
- The host countries should be encouraged and supported in the establishment of their own pest survey and detection networks. Where programs are already in place, they might well be expanded to include the detection of vectors of medical and veterinary importance, vectors of cropland disease and agricultural pests in addition to grasshoppers. The same network could present demonstrations on insect identification and safe pesticide usage. It seems that the ultimate goal should be that host countries take on the entire control program in cooperation with other countries in the region.

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It may be some time before they will be in a position to arrange and finance the entire operation, but standardizing ground-based activities that do not require a heavy investment in training appears a reasonable place to start. After this, the nationals would be trained in the more technical phases of control including good warehousing techniques and the repair and maintenance of equipment. It would seem practical to assign host country nationals to study, work and observe projects in the U.S. with APHIS for a season. This could serve to accelerate the acquisition of the skills they need to take control of their campaigns. Senegal: K. Seethaler

- Supplying personnel; developing training capacities to establish a training center or centers; supporting trained personnel; developing local village and regional center for stockage, training, and identification capabilities; providing landing strips and support personnel for aerial applications. Chad, Niger: J.J. Drea
- Host countries have a responsibility to their farmers to conduct surveys and make forecasts of impending pest problems; provide training in control methods, safe handling and disposal of unused pesticides and empty containers; regulate the importation and use of pesticides; quarantine enforcement to prevent the introduction of foreign pests; research and development including upgrading traditional methods; demonstration of new or improved techniques; environmental protection from pesticide contamination; control assistance to the farmer to prevent catastrophic losses. External resources may be required to accomplish each of these. Senegal: G.E. Cavin
- Host countries should stabilize a standard pest population surveillance system, maintain or develop a strong communication system throughout their country, develop criteria for selecting areas for pest suppression action, identify environmentally sensitive areas, and provide training in pest management activities such as surveillance, pesticide-use management and safety, to their technical field force. Mali: L. Yarger
- Host country operations must be the key or bottom line activity. The host country service must be supported in much the fashion that the Canadians have done for Burkina. Logistics, equipment and training must be supported with the idea that the host country service is the first line of defense against pests and should be able to take care of problems during the non-outbreak years. The donor community should be ready with a "flexible response" plan for outbreak years, whereby aircraft and supplies can be brought in quickly and efficiently as the need arises. But this larger response must be based on the adequate data base provided by host country survey teams. Burkina Faso: W.H. Settle
- They should be at the lead. Donors should supply technicians, financial support, or whatever but only in response to requests from the host countries. The host country should commit personnel and financial support for survey and intervention. Autonomous donor

action programs should only be a last resort. Senegal, Mauritania,
The Gambia: B. Overholt

- Since the financial resources of the recipient countries are limited, the host countries should provide supplies, insecticides, treatment planes and their logistics (operational costs), and to a certain extent, furnish technical assistance, which obviously must be limited, and any other assistance that could contribute to improving the different methods of control. Mauritania: Tahara Galledou
- Technicians must collaborate with donors to use available scientific and technical means to prevent and control grasshopper/locust outbreaks. This means training should be emphasized. Chad: Ngaromillet Michel.
- Host countries shall continue to play the role of: campaign organization; bi and multilateral assistance coordination as it was the case in Burkina; trainer and of its technical agent and of peasants. Burkina Faso: Gana Diagne
- Ensure maximum training at all levels. Ensure an efficient control structure. Organize on a timely basis the coordination of the various donor assistance. Ouagadougou, Burkina Faso: Peter Dettmar

4. D. what is the threshold level at which external resources are deployed?
- When the magnitude of the threat surpasses the capacity of the affected country. Burkina Faso, Niger: C. Kelly
 - The need for external assistance depends on national resources, magnitude of problem and resources available from development and emergency sources. These conditions vary from country to country and from pest to pest. Burkina Faso, Niger: C. Kelly
 - Chad has no resources other than a handful of crop protection agents and a limited number of extension agents. External assistance is needed for any level of pest control. Chad: USAID
 - The answer can only be theoretical as no perfect long term forecast is yet possible and waiting for a threshold limit to be reached before requesting external assistance will be equivalent to "medicine after death". If aid arrives late, materials might not get to site of utilization owing to poor and waterlogged road. A country like Chad has none of the accumulated equipment and materials as most other countries. Neither has it the financial power to strengthen its plan protection team and purchase pesticides and secure the requisite infrastructure. In that case one could say that the threshold for Chad is at the lowest possible level. Chad: J.E. Ohabvike
 - External resources should be deployed after an assessment determining that resources (human, financial) needed are clearly beyond the capacity of the host country. Mali: USAID/Bamako technicians
 - Assistance should be offered when the host country can no longer handle a particular situation themselves. Such assistance can include money, materials, technical assistance, and training. Without assistance, the situation is likely to deteriorate in the future with life threatening implications. Mauritania: W.B. Thomas
 - The role of donor countries is to set up a national infrastructure - the appropriate equipment capable of ensuring crop protection alone. In time of crisis of exceptional attacks -- 1986-87 -- donors must naturally intervene massively; once the infrastructures have been provided and specifically, once the training of personnel has been achieved, the role of donors should be considered only for specific actions. Efforts should therefore be made to identify the most efficient, least sophisticated, and most economical methods of treatment which can be easily applied by the host country. Niger: M. Germaux
 - Donors should establish a firm policy that external resources will not be deployed unless the problem will clearly exceed the capacity of the host country and unless the host country has already committed its own resources to the maximum extent possible. Senegal: E. Huddleston

- External resources are needed when grasshopper-locust rapid build-up in numbers threatens to move across country boundaries and into croplands. Niger, The Gambia: C.M. Voss
- The point at which the host country, U.S. Ambassador, and AID Mission Director (and their "experts") agree that beyond which, a disaster will occur. Senegal, Mali, Burkina Faso: R.G. Adams
- Threshold levels are yet to be determined. Disaster levels, for now, must be determined by mutual agreement between MOA, AID, AND OFDA. J.A. Henderson
- Deploy external resources to Sahelian countries immediately when the need is established. These countries seem to be incapable of mounting a large suppression project at this time (or probably, the near future). Chad: P.W. Orr
- External resources must be employed, especially in emergency situations, when local resources are not sufficient to address a serious problem that envelops a whole region. Campaign strategies based upon the latest technology often leave host governments at a disadvantage in coping with the problem because they lack skills to maintain and operate a complex control system. Just where this threshold level should be often requires a trade-off between what is practical and expeditious and what is considered ideal. Whatever the short-term advantages of the deployment of outside resources, it would seem that there should always be the long-term goal of self-sufficiency for the host government. Senegal: K. Seethaler
- The level of resources needed and the availability of in-country resources must be determined well before any emergency exists. At that time the need for external resources must be determined and these resources deployed in time to be available prior to any outbreak situation. A situation should not reach the level of an emergency before external resources are available. This level will vary with the country and the region within the country. Chad, Niger: J.J. Drea
- Deploy external resources when host country can not support or maintain an effective and efficient pest monitoring system or suppression activity. Senegal: G.E. Cavin
- This question is similar to the one above, will receive the same answer. Nonetheless, the States should make a substantial effort to that foreign resources remain supplemental in nature. Mauritania: Tahara Gal'edou
- When technical, managerial and equipment capacities are exceeded. Chad: Ngaromillet Michel
- Countries submitted to locusts and grasshoppers attacks are among the least advanced (for example, locusts have disappeared from the south of France and Italy when the agricultural development of these countries did not leave free spaces to locusts where they could

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multiply each other and invade cultural areas). We think that it is difficult to determine a threshold from which external resources should be implemented. Thus, when a country has been aware of its role in locust control (I would even say Crop Protection in general and migration predation in particular) and gives him the necessary priority, external assistance should be a lack. Burkina Faso: Gana Diagne

--- Generally, affected countries are those which cannot undertake grasshopper control operations with their own resources. Therefore, the issue is not to know whether, but rather to which extent are external resources utilized; and this question is to be answered on individual country and case basis as well as on the magnitude of the problem itself. Ouagadougou, Burkina Faso: Peter Dettmar

5. Should donors concentrate on host country institution building in attacking the present and long-term problem, or are there a range of intermediate and more cost effective initiatives?
- It is better to concentrate on one institution to avoid diluting the efforts. Burkina Faso, Niger: C. Kelly
 - Donor and host country should work hand in hand. No source
 - For Chad, intermediate intervention is essential as there are practically no resources in country to deal with pest control. However, training is needed as a start for institution building. Chad: USAID
 - Help countries help themselves. Countries should try to become more independent. Chad: Diefenthaler
 - Should concentrate equally on host country institutions and international treaty organizations which are mandated to work internationally. Strengthen all national and regional organizations and build their capabilities to contain any situation at an early stage. Training, equipment, pesticides, vehicles and aerial control capabilities are the basics for effective control. Ethiopia: USAID
 - Locust, grasshoppers and other plant pests (i.e. army worms, birds, rats, etc.) have outbreaks most years in central/west Africa. National capability should be developed/strengthened to deal with these on-going annual problems and to develop an internal structure that can be assisted/supplemented, on an as needed basis, while looking for a longer term solutions. This structure would also provide timely warning to donors since a structure would be in place with year round multi-program activities that justify their existence throughout the year and from one year to the next. We know no alternative to an active skilled core of people in place within/throughout each country with some resources at their disposition. Guinea-Bissau: J. A. Franklin
 - Yes, in Mali's case we believe that investments would be best directed towards improving the managerial and organizational capacities of the CPS. Mali is fortunate to have a nucleus of trained technicians (ex-OICMA) who are already versed in standard crop protection techniques. Mali: USAID/Bamako technicians
 - The best situation would be a long ranging institution building program, along with assistance available for emergency situations. Although this seems to be the plan right now, much more money could be put in to the institution building phase of this aspect of development. For Mauritania, this would include more technical training in all aspects of pest control, as well as organizational training on the management level. Mauritania: W.B. Thomas
 - Institution building is critical, as emergency assistance cannot be used efficiently if there is no pool of skilled personnel. Long term institution building goals need to be ranked according to short term

requirements to manage and control critical pest problems. Training, particularly in management, survey and urgent control procedures, should be short term priorities which can improve short and long term response capacity. Cost effectiveness is hard to determine. The need for an immediate response to critical pest problems is brought about by the lack of adequate institutional capacity. This capacity takes time and effort to develop. It may be cheaper in the short term to simply import more food, but this is not a long term solution. Burkina Faso, Niger: C. Kelly

- Host country institution building is obviously necessary; however, specific intermediate assistance in transfer of ULV ground application technology to replace dusts would be highly cost effective in the range of a 75 percent reduction in the cost per hectare and at least a ten-fold increase in the area treated per day. Donors should develop and install a system of accountability that assures adequate supplies of fuel. Motor bikes or ATVs should be considered to supplement vehicles. Senegal: E. Huddleston
- Donors could consider limited support to crop protection services to help maintain a viable organization for the occasional grasshopper outbreaks. Another cost effective initiative would be to investigate training one or two agricultural pilots in some countries similar to the successful effort in Niger. In this case, two pilots were sent to the U. S. in 1987 and completed agricultural training to return and fly the CPS Cessna Ag planes. This approach from various countries could lead to limited purchase of agricultural aircraft, the economics of which should be a separate investigation. The use of local pilots acquainted with their own country and environment should provide a more economical and efficient approach to aerial pest control. Annual training update and review should be part of the package, along with national government compensation sufficient to hold personnel on the job, is in the long term. Niger, The Gambia: C.M. Voss
- In my opinion it borders on gross indifference to ignore crop protection institutions in host countries, not to the level where the country would be expected to independently counter disastrous outbreaks, but at least to the level where they could provide stopgap measures against serious crop loss. J.A. Henderson
- Continue to build pest management infra-structures in-country. Provide training and equipment to permit effective detection, evaluation, and prevention activities by nationals. Also, Donor Nations should improve cooperative efforts to stockpile and deploy equipment to needy countries. Donors should sharpen their short-range and long-range mobilization, deployment, and communication plans. Chad: P.W. Orr
- This is a policy issue which may be subject to overriding concerns. It seems intuitively desirable, for a number of reasons needing no elaboration at this time, that host countries and their institutions should shoulder responsibility for attacking the present and long-term problem. That being so, it would follow that host country

institutions should be supported and strengthened. There are indeed a range of expeditious and cost effective alternatives in the implementation of control campaigns which in emergency situations ought to be employed for humanitarian reasons. But while this might solve or mitigate the immediate problem, it may not contribute significantly to long-term solutions. Host country institutions are frequently designed, by intent or by default, to resist change. These emergencies offer an opportunity to overcome some of that resistance. The viability of these institutions is essential if we are to reduce the host countries' dependence on external aid. To carry this point even further, admittedly a lot easier said than done, the strengthening of area-wide institutions and cooperation in control programs would be perhaps even more desirable in that it can avoid duplication of costs and errors and effect economies of scale. One of the difficulties in accomplishing all this with grasshopper control programs is their cyclical nature in which there are periods of massive problems followed by periods in which there is very little problem. The hard-earned expertise and institutional modifications that are gained during the emergency years erode during the years of calm. Institution building must be treated as a long-term endeavor with a core of local experts kept current in the latest control procedures. This is the policy of APHIS in the U.S. By sending African observers to the U.S. during our campaigns, we might enhance the viability of their institutions and reduce the costs of unpreparedness during times of emergency. Senegal: K. Seethaler

- The development of in-country training facilities with trained staff and all intermediate stages (regional, departmental, or arrondissement centers) to the village level should be the chief goal of the donors. An effective Crop Protection Service (CPS) should be the ultimate institution for the donors. Obviously, short-term interventions will be necessary until the CPS has been established or expanded to meet the needs of the country involved. Chad, Niger: J.J. Drea
- Crop Protection in developing countries is generally not very high on their list of priorities except when faced with calamity. However, merely building a strong control organization without addressing those items in question ⁴ above will lead to institution building failure as has been demonstrated several times in the past. If the host government is unwilling or unable to support a complete CPS then donor support to extension (services) will probably pay the greatest benefits for the future. For the foreseeable future, donor nations must probably be prepared to intercede in crisis situations. Senegal: G.E. Cavin
- Absolutely necessary. The institution to be built need not be a massive central operation with aircraft and computers, but rather several good scouting teams, good communication equipment and continual effort toward training at all levels, both within country and without. Burkina Faso: W.H. Settle
- The strengthening of national institutions is more than a necessity, but, because of the complexity of ravagers, regional coordination is

also indispensable. This would help limit damages caused by ravagers that easily pass from one country to another. USAID attempted this with its RFCP and IPM projects, but, unfortunately, they were suspended. Mauritania: Tahara Galledou

--- Donors should use the existing structures of crop protection service to help solve the problem. In the long term, it can be expected to create a sub-regional institution to focus on research and information exchange to predict grasshopper/locust outbreaks. Its role will be to provide technical assistance in case of a generalized outbreak. Chad: Ngeromillet Michel

IV. PESTICIDES

1. What resources need to be mobilized to implement procedures and guidelines for handling, usage, and storage?
 - An inventory of what is already available in each host country must first be done. Cameroon: S. Njymian
 - In Chad, handling of pesticide drums was done entirely by hand. Drums are lifted by three or four laborers for loading onto trucks. Unloading consists of rolling the drums off the back of the truck onto tires on the ground to cushion the shock. It is inevitable not to end up with a few broken drums, but for the USAID/Chad program this year the percentage of broken drums was very low. This handling procedure is not the best one and alternative modes can be selected, i.e., bulk handling from specialized containers, or using fork lifts. Such alternatives need to be studied. However, it is certain that additional financial resources will be needed for the specialized equipment and qualified personnel needed to operate it. Resources needed to implement guidelines for use of pesticides would consist of technical assistance to supervise and monitor farmers and extension agents applying pesticide. In a vast country like Chad, several TAs would be needed to properly monitor the program. In Chad, adequate storage of pesticides was provided by the Extension Service in field depots. Thus, additional resources for storage may not be needed at this time. Chad: USAID/Chad
 - (a) Complete technical data on each pesticide must be provided in English and French by the manufacturers. (b) Mass training of operators and particularly peasant farmers who handle the first phase of control operations and plant protection teams of methods of application and safety regulations. (c) Availability of optimal storage conditions and acceptable stores. (d) Availability of good and competent storekeepers and regular stock takings. Chad: J. E. Ohabuike
 - Education: Funds are needed to print guidelines, posters and leaflets. Must help both with host government and internationally mandated organizations. Ethiopia: USAID
 - To establish a new logistics and inspection section to secure safe handling and storage of insecticides. Human resources in the form of proper training, facilities for those trained to do their jobs and clear laws and regulations which should be implemented. Gorta suggested that the most useful donor contribution would be to provide expatriate stores management consultants to set up proper stores management systems. Sudan: GH/L Program
 - Resources are needed to construct/equip proper pesticide/equipment storage and handling facilities at key points in the country. To include trained warehouse managers and established procedures appropriate to the country and the containers/chemicals in use. In addition small engine repair facilities, proper tools, trained and reliable mechanics are needed. Transport equipped service van t/

make periodic visits to regions to service, maintain, repair, etc., system to regularly test arriving and stored chemicals needs to be established. Disposal sites/equipment are also needed. Fuel reserves (underground storage) is often needed in some areas. Guinea-Bissau: J. A. Franklin

- As per (87) Bamako 2171 and Leslie McWain's report, resources in Mali are generally adequate to implement all procedures and guidelines for handling uses and storage of pesticides. Mali: USAID/Bamako Technicians
- Training, sensitization (audic-visual). Mali: S. Sountera
- Along with money, a program will have to be developed that can both work with those responsible to implement safe handling, usage, and storage, as well as to convince them that such guidelines are truly important and worthwhile. At the moment, it is highly probable that even if such a program were to implement such safe pesticide guidelines, they would be abandoned soon after the project was completed. Mauritania: W. B. Thomas
- Better and more extensive training, together with greater accountability within the Crop Protection Services on use and misuse of pesticides. Burkina Faso, Niger: C. Kelly
- Extensive training, responsible personnel, transport facilities, and strict government regulations. The Gambia: A. Laurence
- None, but there is a need for legislation. Niger: F. Boillargeon
- Adoption of legislation and simple extension spots on radio and TV. Senegal: A. B. Ndiaye
- This is strictly a Nigerian problem. It seems unnecessary to try and intervene in this area. Niger: M. Germaux
- Clear, concise guidelines and recommendations should be provided to each Mission and the Mission should assist the host country in developing a plan and procedure. A TDY team could visit each Mission for 2-3 days after the plan is developed. Senegal: E. Huddleston
- There is a need to pre-position approved pesticides in 2 or 3 central storage areas and not donated to any particular country. With donor country control (or FAO) these then could be sent rapidly to areas of infestation spray requirements. There obviously needs to be developed procedures and guidelines for handling, usage, storage and transportation. Niger: C. M. Voss
- Review the program developed for AID-Dakar in 1986. The procedures and techniques we used met overall EPA and USDA guidelines. Hence, AID Guidelines. Senegal, Mali, Burkina Faso: R. G. Adams, Jr.
- A programmatic environmental assessment directed toward establishing such guidelines has been initiated. Sudan: G. A. Schaefers

- Trained techniques (local as well as donor) with authority to implement and take corrective action. F. M. Philips
- Guidelines for handling, usage, and storage of pesticides could be prepared by technical specialists in the USDA Forest Service, APHIS, and the EPA. OFDA should provide input to assure that any guidelines prepared would be practical and usable in under-developed countries. Chad: P. W. Orr
- A national extension service established by the CPS to train the local populations in safe methods and uses of pesticides. They should be labeled in English, French, local languages and graphically wherever possible to better ensure safe handling. Safety is of primary concern in storage, transport, application and residual effects after application. There is a manifest need for training in storage procedures (please see photos in my trip report of 20 April 1987). This holds for the central storage and regional storage and distribution systems. There are many hazards inherent in the movement and storage of large quantities of pesticides throughout the country, and one's worst fears are likely to be realized over and over again. Whatever resources are required to implement sound storage and handling procedures should be expended. The priority on this should be every bit as high as that for the control measures themselves. It will take a lot of training. Senegal: K. Seethaler
- Transport of material to storage areas must be done during seasons when roads are passable prior to infestations. Warehouses must be made usable, responsible individuals must be designated, trained, and in place before material arrives. Adequate application equipment must be in working order, and health and safety training for applicators must be completed. If feasible, training and operation pamphlets or posters should be distributed and in place before actual application begins. Chad: J. J. Drea
- EPA, Pesticide Industry, users such as Forest Service and A&M University groups with expertise in pesticide toxicology, etc. Senegal: G. E. Cavin
- Vehicles to move pesticides to project areas; portable/temporary or permanent storage facilities to insure safe storage; technical specialists to provide on-site assistance in storage, transport, use and disposal of pesticides; contracting specialists to oversee purchase of materials. Mali: L. Yarger
- It is not so much the resources, but the avenue through which these resources are channeled that will determine the success or failure of implementation. We should carefully examine the unquestioned success of the Canadian project in Burkina. Storehouses are clean and orderly, equipment is used properly, old pesticides and containers are minimal and have the attention of the host country service. These are the measures of success. Burkina Faso: W. H. Settle

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- Maybe I've been away from USG jargon for too long, but I'm not sure what this question means. There is certainly no paucity of literature or human expertise in the handling, storage, and transportation of pesticides. It becomes simply a matter of utilizing these resources to train host country workers to do the job, albeit that is not an easy task. Senegal: B. Overholt
- The use of media, especially radio and television, is very advisable for these operations. Mauritania: Tahara Galledou
- Improved organization and management of warehouse; qualified personnel in logistics and use of pesticides; good protective (DD) antidotes; and good radio broadcasting to inform beneficiaries. Chad: Ngaromillet Michel
- Only national resources should be mobilized for these operations which also necessitate repetitive training sessions to convince the users of the cogency of the advice in matters of protection for the handling utilization and stocking of pesticides, but also a continued surveillance from the part of responsible and supervisors of the operations. Effectively very often we observe on the handling spots that agents did not respect the usage precautions: no overalls or no masks because it is too hot, holed gloves or no gloves at all, cupidity of some agents who recover the barrels to resell them, etc... A permanent surveillance of the respect of precautions to be taken is necessary at any time. Burkina Faso: Gana Diagne
- The application of handling, utilization and storage procedures and expert advice, is primarily a question of training, which can be provided from local resources. However, according to the circumstances, funds will also need to be mobilized from external sources to satisfy given needs. Ouagadougou, Burkina Faso: Peter Dettmar

2. Should U.S. government support pre-positioning of pesticides for future use?
- Yes, due to the long delays in provision. Cameroon: L. Soumare & A. Giner
 - Yes, especially when previous years' control were ineffective. Cameroon: S. Njymian
 - Pre-positioning of pesticides in field depots is critical for timely control of pests. AID should support pre-positioning of pesticides for future use, particularly when the threat of heavy locust or grasshopper infestations are obvious. Chad: USAID
 - Certainly yes, particularly as regards reserve stock for timely intervention against early hopper bands by farmers (ground operations), and pre-positioning of chemicals for aerial operations before the rains render the roads unusable. Chad: J. E. Ohabuike
 - Yes, but the situation must be evaluated first. Chad: V. Diefenthaler
 - Yes, depending on potential development of pests in a given area/country. Depends on the shelf life of the pesticide and the likely frequency of outbreaks needing the pesticide in question. Yes, buffer stock enough to control at least 150 sq. miles of locusts. More funds should be made readily available for purchase of additional insecticides. Yes, a year ahead based on worst case scenarios. Ethiopia: USAID
 - It would be possible to do this with Fenitrothion in Sudan. Note: earlier in 1987 CACP consultant Leslie Mcvain assessed in-country formulation at Shell. Sudan: GH/L Program
 - Suggest West African countries, for various species, preposition "normal" year supply. Use survey (i.e., biometric), probably in July or August, to confirm Egg 700 survey results at 1st/2nd Instar nymph stage to alert donors. If emergency seems present, "Normal" year supply should last awhile. This assumes donors/manufacturers would/could respond within 30 days or so. Guinea-Bissau: J. A. Franklin
 - Mission supports pre-positioning of pesticide on a yearly basis. pre-positioning must be accomplished in timely manner on case-by-case basis. This is to avoid buildup of stores. Buildup of stores can become a problem following regulatory changes, i.e., the large West African stock of Dieldrin which now needs disposal. Our recent experience demonstrates that with a reasonable planning horizon, pesticides can be procured offshore, shipped and positioned in the field in time to be effective in control programs. Mali: USAID/Bamako Technicians
 - Yes. It is only through pre-positioning that there can be any chance of control procedures occurring within the time window necessary to

make a difference in crop protection. Many of the crop loss situations in Mauritania during this campaign could have been avoided had pesticides been pre-positioned. Mauritania: W. B. Thomas

- No. It may be useful to begin the movement of appropriate pesticides toward an area of probable need (begin shipments from the U.S. to West Africa) in advance of actual requests. This might prevent the need for high cost air freighting once a situation becomes critical. It may also be possible to position technical grade pesticides at factories near the area of expected need. Once needs are confirmed, the formulation of appropriate compounds and delivery time could be shorter and cheaper than delivery from Europe or the U.S. Burkina Faso, Niger: C. Kelly
- Not for coming year. In general, this should be based on predictions of pest problems and stocks. The Gambia: A. Laurence
- Because pesticides are a lesser evil, they must be given when a foreseeable situation necessitates their use. Senegal: A. B. Ndiaye
- Yes, in view of transportation difficulties and delays in supply arrivals, it seems absolutely necessary for the country to have a stock of one year in advance. Niger: M. Germaux
- Only after an inventory of available material is made, determination that storage facilities are adequate and weatherproof, and that responsible persons are available at the storage sites, should the U.S. consider pre-positioning pesticides for future use. There should be a strict system of accountability, but not a constraining system. Chad, Niger: J. J. Drea
- pre-positioning of pesticides is not a good strategy. The disadvantages include proper handling and storage, shelf life, potential of needing a different pesticide for a different problem and excessive use of the pesticide if it is available. Senegal: E. Huddleston
- Based on entomological forecasts, this may be economically viable. Senegal: R. G. Adams, Jr.
- After establishing a timetable for a mobilization strategy, it is appropriate to preposition sufficient pesticides to allow for its initiation. Sudan, Mali: G. A. Schaefers
- Yes, if it remains under U.S. control. F. M. Philips
- Only when safe, in-country storage facilities are constructed. Pesticides should be prepositioned for only a short time, possibly 1-2 years at most. Longer storage creates many problems, such as leaking containers, degradation of the insecticide, and the potential for pesticide contamination. Chad: P. W. Orr
- It would be prudent and probably cost-effective to preposition pesticides for the current year. Considering the storage facilities

and warehouse techniques in place in the host country, stored pesticides are being wasted and present potential environmental and health hazards. It does not seem a wise policy to preposition pesticides for use in future years. Senegal: K. Seethaler

- Support pre-positioning when an imminent threat exists. Most pesticides deteriorate rapidly when subject to long-term storage at less than optimum conditions. Senegal: G. E. Cavin
- If USG is involved in any aspect of a suppression project, then the USG needs to insure that pesticides will be delivered, positioned and managed efficiently and safely. Mali: L. Yarger
- Yes, if you can decide upon what pesticides will survive well for long periods of very hot weather, and if you can assure the chemicals will not be sold to private users or stolen (such as has been the history of pesticides stored in Senegal). Burkina Faso: W. H. Settle
- It would depend on the circumstances. The host country should take care of this. In fact, I believe that every host country pesticide contract (whether financed by a donor or by the host country government) should include the transportation of certain quantities to regional depots (if adequate storage facilities exist). These quantities should never exceed the amount anticipated for use during the following growing season. Whether we should become involved in this would depend on the resources available in a particular country. Senegal: B. Overholt
- pre-positioning of pesticides for future use is a necessary measure that prevents outbreaks of ravagers. It is not advisable to wait for the appearance of ravagers before developing a method to combat them. On this subject, USAID should insist on the need to position treatment products and equipment on a stand-by basis. Mauritania: Tahara Galledou
- There is a lack of good road infrastructure and limited logistical capacity. During the rainy season, many roads in the country are in bad condition for travel. Chad: Ngaromillet Michel
- Only the setting in advance of pesticides allows an efficient intervention and at a lower cost. If as in 1986 we wait until grasshoppers are here to take a decision to intervene with pesticides, we may carry them by plane in order that they do not arrive too late.
- The comparison between the price of this product rendered in Burkina in 1986 and in 1987 is edifying. In 1986 Fenitrothion price 96% ULV rendered in Ouagadougou by air freight was 74,50 FF/liter; meanwhile in 1987, it was 45,30 FF/liter by road and sea, to the same supplier (after international bid).
- To our opinion, when the locust situation of end of campaign (1985 and 1986) allows the prevision of an explosive locust situation, the

United States Government should encourage the setting in advance of pesticides for an external use. Burkina Faso: Gana Diagne

--- For an efficient grasshopper control, it is absolutely necessary that all resources, including pesticides, be available and in place well in advance of the outset of infestations. Ouagadougou, Burkina Baso: Peter Dettmar

3. Is there a potential for in-country formulation of pesticides, and should this be a possible alternative for U.S. procurement? If so what is required in-country for formulation of pesticides?
- Local suppliers are available. Cameroon: J. Dorman & M. Lang
 - Yes, contact with the concerned ministry should be established to determine the status. Cameroon: L. Soumare & A. Giner
 - Yes, local formulating materials and perhaps package materials too. Cameroon: S. Njymian
 - There is no potential for formulation of pesticides in Chad over the next several years. Even the formulation of poisoned bait with dust would be difficult as even the bait is hard to come by. Chad: USAID
 - None so far for Chad. Though the Lake Chad Basin Commission has suggested that Nigeria study this possibility with its oil by-product. Chad: J. E. Ohabuike
 - No potential for ULV formulations but dust formulations for baiting/dusting may be made. No, pesticide development and manufacture require large resources that are not cost-effective for third world governments to deploy. It was noted that periodic surveys of stock and the potency of such stock should be made with attention as to how best to dispose of obsolete stock with due care for the environment. Ethiopia: USAID
 - No in-country potential exists. Closest is Senegal. Guinea-Bissau: J. A. Franklin
 - In the Mali section, pages 24-31 of the Mcvain Report suggest that there is a potential for formulation of pesticides in Mali. However, it is our view that formulation of liquid pesticide supported by U.S.G. funding is not feasible from two standpoints: (1) cost of transporting imported technical liquids (solvent, etc.), compared to the actual cost of the formulated material from the U.S. or other western countries; (2) possible liability problems resulting from improperly formulated pesticides. Mali: USAID/Bamako Technicians
 - Yes, regarding Mali, the infrastructure exists. Mali: S. Sountera
 - Yes, there is a pesticide formulation plant in Nouakchott. If the USG were to purchase pesticides, this would be the best place to do it. Formulation here requires the active ingredient be supplied by the donor. Mauritania: W. B. Thomas
 - Niger: Yes, but the factory is involved in producing chemicals which are not approved by the USG. The use of existing factories in regional centers, such as Abidjan or Nigeria, to produce pesticides in response to immediate needs should be explored in more detail. Local or regional production may be more responsive to immediate needs than importation from the U.S. The problem of adequate technical grade pesticides for formulation could develop if demand

increased too quickly. The potential for the entry for U.S. manufactured or licensed products may be good as it appears the overall pesticide market is underdeveloped in West Africa. On the other hand, most pesticides are provided as in-kind aid or funded through bilateral assistance and tied to one specific source. Burkina Faso, Niger: C. Kelly

- No in-country formulation facilities. The Gambia: A. Laurence
- Yes, but active material is required and equipment for mixing. Niger: F. Boillargeon
- Yes, for in-country formulation of pesticides because only active material is needed. Senegal: A. B. Ndiaye
- This seems an economic survey should be carried out. But the needs of Niger in a normal year perhaps do not justify the creation of such an enterprise. RICO company--in 1987--produced certain pesticides. Their costs and real impact on the field must be studied, as well as the percentage of active material. Niger: M. Germau
- I do not see the structure to implement at present. But worth considering for future. The Gambia: A. McKenzie
- Senegal is well equipped for pesticide formulation. Formulation is not required for ULV malathion or fenitrothion for grasshopper control. Senegal: E. Huddleston
- There may be in places like Dakar. However, it would be limited there and nonexistent in other Sahelian nations. Mali, Burkina Faso, Senegal: R. G. Adams, Jr.
- No, except for baits. Control campaigns utilize ULV's which are not formulated in-country. Sudan: G. A. Schaefers
- Yes, however, it is essential to have well trained technicians. Also, it is necessary to have required dilutants on hand. Otherwise, it would be better to formulate abroad. F. M. Philips
- In-country formulation of pesticides would be practical if there is a large enough demand for pesticides in agricultural crops. Formulation facilities are very expensive and require highly-trained personnel. Chad: P. W. Orr
- Senegal does have the capability of formulating pesticides in-country and represents a very reasonable alternative for U.S. procurement. Whether to do so may well be a policy decision of whether it is preferable to do as much business in the U.S. as possible or whether to get the local economy more involved. In the absence of such a stated policy, it would seem wise to subject procurement to competitive bidding based on strict business considerations such as cost and reliability. While weighing the merits of in-country formulation, it would be well to consider the impact on the local firm's capacity to produce the

quantities necessary for both grasshopper control and competing local needs. Consideration might be given to partial contracts to encourage local enterprise but not at the expense of other local requirements. Senegal: K. Seethaler

- In Chad, it is still a long way off. In Niger, the Department of Plant Protection is only 2-3 years old. A better base of operations with more trained personnel is needed. If formulation is possible, it would probably need considerable outside capital, probably French, considering the economic ties of the country. Chad: J. J. Drea
- Formulation plants have been established in several of the lesser developed nations. Be wary of any that do not operate under license to a large, established pesticide manufacturer. Even those that are should be evaluated in advance of use by a recognized expert. The end product should be analyzed to assure adherence to specifications prior to use. Senegal: G. E. Cavin
- There could be a potential for in-country formulation of pesticides if the need for pesticides is anticipated for a contiguous time period such that there would be cost effectiveness in the endeavor. However, pesticide formulations are continuously being refined, and new pesticides are being tested and marketed in countries outside of African countries. Seems one would have the most flexibility to use a pesticide that is most biologically effective and cost-efficient would be in a situation when countries can choose from the market place rather than be "strapped" with a pesticide that the host country has been committed to through formulation setup expenses and agreements. Mali: L. Yarger
- I believe the U.S. Government should stay far away from supporting the activities of the pesticide merchants. We want to avoid the situation where someone is looking to "create a market" for pesticide use. Pesticides for grasshoppers in large quantities will be an infrequent need that should be part of the "flexible response" approach. Burkina Faso: W. H. Settle
- Currently I am aware of formulation plants in Senegal, Mali, and Mauritania. I'm sure there are others. This would seem to be the most economical approach if carrier substances are available in the host countries. Problems would be the ability (or desire in some cases) of the plants to meet specifications, how to test products to be certain they meet specifications, and what to do if they don't. The one facility I'm very familiar with is in Mauritania. They had no routine procedures to test end products. Through U.S. laboratory testing we found that the product was seldom what it was supposed to be. Situations such as this are a major constraint. I would rather work with products formulated in developed countries. Senegal: B. Overholt
- For in-country formulation, which is very possible, active technical material must be made available to the formulating country and formulation costs must be financed. With regard to powders, we have a good base (gypsum) and the mine is located 45 km from Nouakchott.

- A national developer with its own funds owns a formulation unit with an annual production capacity of 50,000 tons of powder for dusting, 200,000 liters (any mixed liquid product), and 1,000 tons of rat poison (bait). This company has formulated all the powder and liquid products that we use, whose acquisition has been negotiated locally. It has made products that have been supplied to us by UFED, USAID, GTZ, FAO, and LFM. Mauritania: Tahara Galledou
- USAID should encourage one country to produce pesticides. This will reduce high costs of transport and delays in delivery. Needs will be to have the active ingredients, technology and training of nationals. Chad: Ngaromillet Michel
- The formulation of insecticides powders can be planned and must be encouraged. In fact, during their low percentage of active substance (1 to 5%) we import effectively between 95 and 99% of inert substance. So, we can envisage a factory of local formulation where we could only import active substance. The setting of such a factory would allow the partial resolution of the problems which may derive from the urgency and the pre-positioning of products. Moreover, there would be new employment. Burkina Faso: Gana Diagne
- This is a difficult question to answer for the answer depends on a great number of factors. For grasshopper control alone, the answer would be rather negative because this phenomenon is periodic and the cost/benefit more than questionable. Ouagadougou, Burkina Faso: Peter Dettmar

4. To what extent should U.S. government participate in the planning for and the disposal of pesticides?
- It should not. Cameroon: M. Lang
 - To be discussed with the Ministry of Agriculture. Cameroon: A. Giner
 - Assist national crop protection personnel through training and provision of information. Cameroon: S. Njymian
 - AID should plan for disposal of its own drums and pesticides. In addition, AID should also encourage host countries and other donors to do the same and even offer technical advice for development of specific plans and their implementation. Chad: USAID
 - Full participation is recommended and perhaps with joint effort of FAO and other donor governments until such a time when farmers could be brought to purchase their own pesticides, perhaps with government subsidies. Chad: J. E. Ohabuike
 - Every contributing organization must get involved. Chad: V. Diefenthaler
 - USG should send experts/consultants on safety and disposal to assess possible re-use, disposal methods and techniques and to investigate further applications. As requested by the host government, please note: the MOA official noted that advice and assistance would be welcomed. Ethiopia: USAID
 - Financing training and optional methods for incineration which are not too costly and do not cause any human, animal or environmental pollution. One Sudanese respondent claimed that PPD waste is only 1/4 of the problem, the remaining 3/4 of the responsibility rests with the irrigated schemes. Another suggested the USG could fund short- and long-term consultancies to address the environmental pollution issue. Sudan: GH/L Program
 - Consider including in contracts the responsibility of the vendor/manufacturer to buy back containers for proper disposal in-country or re-export of containers for proper disposal elsewhere subject to approval. Encourage other donors to do the same. Let us try to make it a problem also for the manufacturers. Withhold an adequate percentage until they do, even if it costs more. This may encourage responsible companies to deal with the issue, while eliminating fly-by-night operations. They know their chemicals better than we do. Guinea-Bissau: J. A. Franklin
 - In adherence to the formal announcement made at the recent Rome Conference (USAID responsibility from cradle to grave), Mission is currently assisting the GRM CPS in the planning for and disposal of pesticides. Our program currently focuses on pesticides imported by USG funds. We believe that the U.S. should also consider an action in the planning for, and disposal of, existing stocks of outdated and outlawed pesticides. Mission has obtained a general accord by the

- To help research programs on the subject. Mali: S. Sountera
- The USG should offer assistance into the technical aspects of either disposal or better storage techniques. If requested by the host country, the USG could offer funds toward disposal. Mauritania: W. B. Thomas
- USG should provide technical information and assistance relating to disposal of USG financed pesticides and containers. We should encourage and support technical assistance through the FAO or other organizations for the proper handling and disposal of pesticides provided through other sources. Assistance for the disposal of USG furnished pesticides could also address disposal of pesticides from other sources. Burkina Faso, Niger: C. Kelly
- Advice is very useful, especially regarding calculations of required maximal stock (based on crop areas and previous pest situation) and selection of effective low toxicity pesticides. The Gambia: A. Laurence
- Yes, absolutely. Niger: F. Boillargeon
- Financing and technical assistance. Senegal: A. B. Ndiaye
- Is it necessary for donor countries to poke their noses everywhere? Is it not possible to have confidence in the Crop Protection Service and then intervene only at its request? Niger: M. Germaux
- Wholly. It is probably the most important aspect of a program in terms of potential environmental/health problems. The Gambia: A. McKenzie
- To the extent possible, all donors should work together through FAO to assure a uniform acceptable policy for pesticide disposal. Senegal: E. Huddleston
- 100%!--at least to the limit of statutory and perceived liabilities. Very important. Senegal: R. G. Adams, Jr.
- Proper pesticide disposal still represents a challenge in the U.S., but we have adequate technology to assist in the safe disposal of pesticides in LDC's. We should offer what technology we have. Sudan: G. A. Schaefers
- If U.S. supplied pesticides, it is imperative that U.S. be involved in safe disposal. F. M. Philips
- If the U.S. Government is going to provide pesticides, we must be deeply involved with proper storage, use, and disposal of unused pesticides. Chad: P. W. Orr

- Considering the experience the U.S. has in environmental and health issues related to pesticides and the relative lack of such experience or awareness in the Host Country, it would seem a dereliction of accountability to concern ourselves only with insect control while abdicating our responsibilities for the consequences of control actions to humans and other non-target species. The planning for and disposal of pesticides should be an integral part of the whole program in which we should be involved to the extent that it is necessary for us to be satisfied that good health and environmental standards are met. Senegal: K. Seethaler
- As long as the U.S. has regulations regarding the purchase and use of items that have restricted use or are prohibited in relation to any U.S. donor participation, the U.S. should be involved in the planning and disposal of pesticides. These restrictions seem to be understood in Niger and Chad. The problem is having this concept accepted by the countries involved since it is perceived as "meddling" in their internal affairs. The U.S. should have close contact with the pest control programs to be aware of proposed purchases. Somewhere in this, there should be representatives of the chemical industry such as the National Agricultural Chemical Association. Niger, Chad: J. J. Drea
- If the host government has failed to assume responsibility and take action, USAID would appear to have at least a moral responsibility to assure proper use or disposal of unused pesticides and their containers for those pesticides it provided. Senegal: G. E. Cavin
- USG should provide technical expertise, and financial assistance if warranted, in the planning and disposal of pesticides from USG supported pesticide use projects. USG should make available technical assistance, when requested, in the disposal of pesticides from projects not supported by USG. Mali: L. Yarger
- Environmental concerns are a global problem and thus require a global response. This is an issue that would best be brought up and effectively dealt with by the donor coordinating committees within each country. The U.S. should be a strong advocate for the issue, but use the issue to promote self confidence in problem solving within the international decisionmaking body of the donor technical and coordinating committees, (in which I believe strongly to be the best forum for successful action). After all, this is one of the few solvable problems, so let's solve it together! Burkina Faso: W. H. Settle
- To a large extent. This is one major problem in the Sahel that no one seemed to be addressing. In the early 1980's there were still large quantities of highly toxic chlorinated hydrocarbon insecticides in Mauritania left over from the large grasshopper outbreaks in the early to mid 1970's. The situation was the same in Senegal and probably other countries. Nobody, including myself, knew what to do about this. Regulations in developed countries require incineration at high temperatures but there are no incinerators in the Sahel. Someone should address this problem. Senegal: B. Overholt

- The Sahel region faces very difficult climatic conditions. Therefore, these pesticides' needs and their use should be taken into consideration. Any product that can last a long time should be kept; otherwise, operations will be contingent upon the amount of space to be covered and the possibility of reinfestation. It must be noted that under our conditions deterioration of the product should not be a basic problem. Mauritania: Tahara Galledou
- We think that the planning of pesticides utilization and their eradication is the governments' responsibility. Beside, FAO member states have adhered to pesticides utilization code. Donors' role is can only be an advice role to (i) provide any necessary documentation, and (ii) proceed to samples analyses wherever the need be. Burkina Faso: Gana Diagne
- Planning and decisionmaking relative to the use and elimination of pesticides is the responsibility of the government concerned. Donors can offer their support in the form of training and expert advice. Ougadougou, Burkina Faso: Peter Dettmar

5. Do we need standards/specifications for pesticides and application equipment?
- Yes, that would expedite emergency requisitions. Cameroon: M. Lang
 - Yes. Cameroon: A. Giner
 - Yes. Cameroon: S. Njymian
 - It would be helpful to know what spray equipment is available and what pesticides can be used with each type. Equipment needs to be standardized to enable maintenance and facilitate training. Chad: USAID/Chad
 - Yes, these are very essential. Chad: J. E. Ohabuike
 - No. Enough standards exist. Chad: V. Diefenthaler
 - All reply yes. One noted there is probably a role for most governments to manufacture application equipment rather than pesticides. Ethiopia: USAID/Addis Ababa
 - Symmons said no. Five people said yes, although they didn't feel this was an urgent issue. One said there are already laws regulating pesticide use, sale and purchase according to WHO and FAO guidelines, but no specifications for spraying equipment. Sudan: GH/L Program
 - Yes, we need to do this (subject to established selection criteria) for equipment/chemicals/formulations to the extent possible within a given country. There will be problems since some donors prefer to give in kind their countries' products, not money. We should distribute existing Imperial College (UK) test results to donor representatives/AID Missions on application equipment durability as guide to donor/FAO procurement. Guinea-Bissau: J. A. Franklin
 - Yes, the U.S. should strongly support studies of existing ground and aerial application equipment and promising newer methods. Mali: USAID/Bamako
 - Yes. Mali: S. Sountera
 - This would make life easier. However, the CPS here is just happy to get anything they can. Mauritania: W. B. Thomas
 - Yes. Burkina Faso: C. Kelly
 - Yes, preferably limited number of brands in-country, limited types of pesticides and general specification on dosages of each pesticide for each sprayer (calibration in the field by farmers and field staff is weak point). The Gambia: A. Laurence
 - As much as possible. Niger: F. Boillargeon
 - Yes. Senegal: A. B. Ndiaye

- No. Niger: M. Germaux
- Absolutely, so much dangerous and useless equipment is sent. Not enough thought is given to matching equipment/pesticides, and tailoring pesticides to countries needs and capabilities. The Gambia: A. McKenzie
- Industry standards for U.S. pesticides are adequate. APHIS and Forest Service guidelines are adequate for aerial application. England has a good policy of thorough evaluation of pesticide application equipment prior to purchase for overseas (Dr. Graham Mathews, Imperial College). Perhaps the U.S. should have a similar policy. Senegal: E. Huddleston
- There should be standards and specifications for pesticides and application equipment. Some types of ground equipment are impractical to use in Africa. Perhaps the same can be said for aircraft. A small plane may be cheaper but may not have the fuel range to reach the spray areas from the closest air strip. Also, chemical barrels with only Chinese or Korean characters would pose difficulties. The Gambia, Niger: C. M. Voss
- No--we (USAID) don't need "standards" or "specifications." Already published standards/specs and procedures in use by EPA and USDA agencies should be more than ample! Senegal: R. G. Adams, Jr.
- Yes, Such standards would significantly facilitate support from donor countries. Sudan: G. A. Schaefer
- Specifications for insecticides should be established. They should include maximum toxicity, minimum percent mortality at the recommended rate per acre, and residues. To accomplish this, 91% technical Malathion could be used to compare other materials to. Examples: If Malathion has an LD50 of 1500, then materials with an LD50 of less than 1000 should not be considered. With proper application, 8 oz. of Malathion consistently obtains better than 90% control; materials that don't obtain a minimum of 90% control at the recommended rate should not be considered. Only insecticides that have had a residue tolerance established for the type of application involved and have been shown not to exceed that tolerance at the recommended rate should be considered. The standard spray system with hydraulic nozzles using stainless steel flat fan nozzle tips for oil formulations and steel hollow cone tips for water formulations has done an acceptable job on all commercial formulations that I have used. If the spray system is thoroughly cleaned and the material screened going into the aircraft, then even for ULV applications this system is the least costly and far and away the least troublesome. J. A. Henderson
- Yes. F. M. Philips
- Yes, the standards should be practical. Chad: P. W. Orr

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- Yes. A great deal of the expense, efficacy, and safety of the operation hinges upon the standards and specifications for pesticides and application equipment. Some of the most egregious waste of past operations can be observed in the stockpiles of improperly stored pesticides and inappropriate non-functional equipment that are left over at the end of the campaign. Standards and specifications are, of course, necessary to ensure that the procured chemicals are not inappropriate for the control of target species. Senegal: K. Seethaler
- Standards/specifications for pesticides and equipment: There is a definite need to standardize, for the country, not the overall program. Some farmers handle powders better, other programs are devoted toward spray application. Consequently the type of pesticide formulation should be established, the application equipment must be standardized for the material used. If at all possible, the donor source should be standardized due to variations in formulations. A quality control program is essential for all the pesticide application programs. All too often the active ingredient does not come close to meeting the specifications on the label. Often the label itself is incomplete or misleading. Chad: J. J. Drea
- Yes. Senegal: G. E. Cavin
- Yes. Mali: L. Yarger
- Of course. Burkina Faso: W. H. Settle
- Certainly, Wouldn't this be part of a typical contract? Senegal: B. Overholt
- This is especially necessary because it would greatly limit many losses, particularly of equipment. Mauritania: Tahara Galledou
- Yes. Chad: Ngaromillet Michel
- Yes, pesticides are provided on the basis of technical specifications allowing their good utilization at recommended dosages. It would be necessary that each delivery of pesticides by an autonomous laboratory. The inclusion of such a provision in the bids for pesticides supply would dissuade the cheating and avoid the comments we hear very often "This product isn't good at all."
- If this certificate of conformity is not delivered, the member elect should be authorized to take a sample and to send it for analysis in a laboratory of his choice at the expense of the supplier. Burkina Faso: Gana Diagne
- For effective pesticides use and the protection of man and the environment, standards/specifications are indispensable. Ouagadougou, Burkina Faso: Peter Dettmar

- b. Should donation of pesticide formulations be matched to application devices?
- Yes. Cameroon: S. Njymian
 - Most governments should pressure donors to provide the appropriate pesticide formulation if standards have been developed. Chad: USAID
 - Yes, particularly as in the case of Chad which has limited range and number of application equipment and no spray aircraft of its own. Chad: J. E. Ohabuike
 - Yes, particularly important for equipment which can only use either ULV or EC formulation. Chad: V. Diefenthaler
 - Yes, whenever possible. Ethiopia: USAID
 - Seven people answered yes without explanation. Symmons said that ULV can't be put out through a sprayer designated for EC without a lot of waste. An FAO consultant said "should mind its own business." Others said by pointing out the environmental hazards associated with the use of undesirable pesticides. One suggested USG should work through WHO and by legislating pesticides laws. Another said USG purchases for Sudan should be done according to FAO/WHO and Sudan Government Regulations and through the 1974 Pesticide Act. The FAO code of conduct, if approved by Sudan, will also strengthen Sudan's pesticide selection process. Sudan: GH/L Program
 - No, it should be the reverse in conjunction with other considerations. Guinea-Bissau: J. A. Franklin
 - Yes, it is desirable to have training associated with these products. Mali: USAID/Bamako
 - Yes--indispensable. Mali: S. Sountera
 - If at all possible. This is not always the most important aspect of the program, and can complicate things where the pesticide donations are multilateral. Mauritania: W. B. Thomas
 - Yes. Burkina Faso: C. Kelly
 - Yes. The Gambia: A. Laurence
 - Not necessarily, but preferably. Niger: F. Boillargeon
 - Yes. Senegal: A. B. Ndiaye
 - This is a current situation. Niger: M. Germaux
 - Yes, without doubt a serious problem in any campaign. The Gambia: A. McKenzie

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- Yes. Senegal: E. Huddleston
- Yes, pesticide formulation should be matched to application devices. Ground spray materials would differ from ULV aerial spray materials. It would be interesting to know from the manufacturer if ULV aerial material could be reconstituted with additives to mix with water for ground application. Niger: C. M. Voss
- Yes, at least to the point that they meet U.S. specs. Otherwise, they should not be used in U.S. programs. Senegal: R. G. Adams, Jr.
- Yes, this is one reason for standards and specifications. Sudan: G. A. Schaefers
- Yes. F. M. Philips
- It is essential that application equipment be adequate to dispense the pesticide. This requires close cooperation and communication between the FAO (Rome) and other donor countries. Application equipment should not be a donor nation's castoffs. Chad: P. W. Orr
- Either that or, perhaps more appropriately, the application devices should be matched to the pesticide formulations to be used in the control campaign and be as simple and inexpensive as possible. Complex application devices break down and cannot be repaired because spare parts are unavailable and technical training in making on-site repairs is usually lacking. Senegal: K. Seethaler
- This is where a "National Coordinating Committee" such as was active in Chad is essential. The committee reviewed the pest problems, the distribution of material and personnel, estimated the future needs, etc. This would be the logical place to standardize the pesticides and the equipment needs before they were purchased or shipped. Chad: J. J. Drea
- Donation of pesticide formulations should be matched to application devices to assure effective use. Host countries should not be burdened with pesticides for which application equipment available cannot be used. Mali: L. Yarger
- Of course. Burkina Faso: W. H. Settle
- Of course. Otherwise, what good are they. You can't spray if all you have is dusters. Senegal: B. Overholt
- If equipment is standardized, the donation of products should take this into consideration. Mauritania: Tahara Galledou
- This will enable them to avoid bad applications. Chad: Ngaromillet Michel
- The material of application must be accompanied with directions of use and maintenance in the language of the country as well as of

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spare parts which wear rapidly (1st emergency). Ouagadougou, Burkina
Faso, : Gana Diagne

V. ENVIRONMENTAL CONCERNS

1. How should U.S. government influence international selection of pesticides? (and how should our own USG purchases be selected?)

- Uncertain but within limitations of Reg. 16 and by choosing most effective to species involved, least harmful to environment and informing host governments accordingly. Cameroon: J. Dorman and M. Lang
- By going through the appropriate organizations. Cameroon: L. Soumare and A. Giner
- Application of EPA regulations. Cameroon: S. Njymian
- The U.S. Government has what seems to USAID/Chad the best chemicals available for grasshopper and locust control. Namely Malathion and Carbaryl. The advantages of these chemicals over others needs to be brought to the attention of the host governments who have final say on what will be allowed into the country. Selection of pesticides should not only be based on kill rates or single tests performed in Africa. Immediate and long term effects on humans, animals, and the environment must be well known and based on extensive field tests.

It was particularly worrisome, for USAID/Chad, to see that a chemical like Fastac was provided through donor funding both in 1986 and 1987. Fastac was not even selected by AID for field tests in Africa this year. On numerous occasions, USAID expressed its concerns to both the donor and technical committees over the use of Fastac to control grasshopper populations in urban areas. The chemical was nevertheless used. Host governments and others tend to look at Americans as alarmists. Chad: USAID
- A) By enlightening various governments (Ministries of Agriculture, Fish and Forestry) through FAO. B) By annual or biennial meetings of pesticide manufacturers under the auspices of FAO. C) Selection of pesticide should be related to target species - crop type and its maturity as to determine whether fast disintegrating or more persistence is required. Of course the treatment of hoppers during early rains with longer remenance would be recommended. Chad: J. E. Ohabvike
- Education (training or promotion programs). However time is needed to change people's minds. Chad: V. Diefenthaler
- By offering to pay the difference in price in order to encourage the use of safer but more expensive compounds. Ethiopia: USAID
- Use of U.S. dollars for selected U.S. pesticides that can meet certain established use criteria appropriate for LDC's. All countries should heed FAO code of conduct. Consider an international label in English/French/Spanish. Vendors need to supply complete technical label, environmental/safety considerations, antidotes, adequate training package on storage/use/disposal, etc. We should

test chemicals upon arrival and before payment, and remaining stocks before next application season. Continue to raise environmental/safety concerns. Guinea-Bissau: J. A. Franklin

- A major role for U.S. is to continue the current policy of supporting independent pesticide testing programs. Results of these tests as well as from international agencies (i.e. TDRI, FAO) should be disseminated to all interested parties. U.S. should support seminars and forum whereby testing results can be examined. Such a testing and selection program must include non-U.S. approved products in order to solicit the collaboration of all donors. Mali: USAID/Bamako technicians
 - The USG influences the selection of pesticides that the Crop Protection Service uses by refusing assistance if U.S. banned pesticides are to be used. Thus, since USG donations are almost always somewhere in the control operations, selection of pesticides are influenced. Mauritania: W. B. Thomas
 - Our ability to influence other donors' purchases of pesticides is directly related to whether a donor is supporting domestic or regional suppliers. As this is the case in many purchases of pesticides, we can expect to have little or no direct impact.
 - On the other hand, we can assist recipient governments in knowing more about the risks and advantages of pesticides and encourage them to be more specific and discerning in what they request or accept as assistance. We can also train national personnel in, and encourage the use of, technical specifications as a screen for use by host governments in selecting the best pesticide for a specific pest problem. In this process, we can encourage an opening of the West Africa pesticide market.
- For the procurement of pesticides by AID, there does not appear to be any good reason to change Regulation 16. There is a need for more detailed information on available pesticides, resolution of the EPA certification requirements and clarification of the procedures for waivers, if they are required. Burkina Faso, Niger: C. Kelly
- Yes. Use EPA list. Selected should be the least toxic chemicals given the poor protection facilities. The Gambia: A. Laurence
 - According to local laws in force at this time and without interference. Niger: F. Boillargeon
 - Another ridiculous issue. Before legislating, intervening, and INTERDICTING in this area, the needs of the host country must be well understood. To control locusts, especially in desert regions, PERSISTENT products must be used. As the manufacturers of insecticides identify this product; after, only after, identifying this product will it be possible to discuss (the issue). Niger: F. Boillargeon

- By observing the same care in Third World countries as they would their own. This applies to all donating countries. Assess capability of country before supplying. The Gambia: A. McKenzie
- Well conducted field trials in cooperation with other donors would be helpful. For USG purchases, U.S. products with EPA approval should have first priority. Senegal: E. Huddleston
- The best controls are financial, unfortunately--economic and political constraints are withstanding. USC purchases may need to be skewed a bit to host country particularly if it has "EPA-like" rules that are comparable, but not duplicates of U.S. rules, etc. Senegal, Mali, Burkina Faso: R. G. Adams
- Education of donor countries as well as host countries relative to the environmental safety and effectiveness of selected pesticides. USG purchases should be based on demonstrated effectiveness and a reasonable level of environmental risk as determined by EPA or WHO registration status. Sudan, Mali: G. A. Schaefers
- Selection should be based upon most efficacious (contact and residual) as well as least deleterious to the environment. F. M. Philips
- USG should recommend the most effective and environmentally acceptable insecticides to control the pests involved. The insecticides should meet the standards we use in the United States for similar pests. Pesticide selection should be based on technical criteria and not upon which country manufactures which insecticides. Chad: P. W. Orr
- The long term approach is education, publicity, and demonstration of harmful effects - probably through publication. Immediate approach is by manipulation of financial support as in enforcement of AID regulations. Also, U.S. Chemical Industry through the National Agricultural Chemical Association, for example, should be involved in the planning, establishing guidelines, and the execution of purchases of pesticides. Eventually the choice will have to be made between long term damage or hazardous effect on the environment and the immediate protection of crops and food production for the next day's meal. Chad, Niger: J. J. Drea
- The U.S. Government should consider its own environmental standards as minimum when involved in the international selection of effective pesticides.
- Environmental assessments serve the function of providing information that makes people aware of the nature and extent of environmental concerns and of the expected and actual impacts of a project. Assessment should be made whether or not regulations and procedures are in place to mitigate a negative impact. Assessments eliminate the excuse of ignorance when it comes time to establish responsibility for environmental damage.

In the best interest of all parties, the host countries and the international community, the donors should assume a commitment to sound environmental practices to the same degree as mandated in their home countries. It may require a further maturation of cooperative interaction before we can expect universal compliance.

The negative environmental consequences of man's misapplication of pesticides are generally not as acutely evident as the crises the misapplications were intended to alleviate. This may cause some people to become impatient with environmental regulations. But, the lingering effects may be a lot worse than the immediate impact. The concept of residual toxicity, which varies among the numerous classes of pesticides, is not properly understood by the broad spectrum of the public. Understanding cause and effect of pesticide misapplication requires extensive public education. It frequently happens that the fears of many people are without merit; at other times they are quite real and should not be lightly dismissed. Overall, concerns about the environment are well warranted, even though they are often obscure, and they should rightly command the dedicated involvement and assistance of all national and international entities associated with the control program. Compliance with sound environmental practices is an ethical imperative incumbent upon all parties for the sake of all parties.
Senegal: K. Seethaler

--- U.S.-EPA registers pesticide formulation in the U.S. to regulate the sale and use of pesticides. There are pesticide formulations that are used outside of the U.S. which do not have EPA registration, but which have the same ingredients. USG use of pesticides in pest management strategies outside of the U.S. should preferably be those that have U.S.-EPA registration: USG could then enjoy a "high" comfort level that the EPA registered pesticide and will not cause adverse effects to human health or the environment when used according to label instructions. USG should influence international selection of pesticides through financial support of only those projects that use EPA registered pesticide which will not cause adverse effects to human health or the environment when used according to label instructions. USG should influence international selection of pesticides through financial support of only those projects that use EPA registered pesticides or pesticide formulations which have been reviewed by, and concurred with for use as intended, by the EPA.
Mali: L. Yarger

--- U.S. government influence on international selection?--A very difficult question. We should first realize that we are inexperienced in African grasshopper problems, and that the British and French have had far more experience than we have had, and that we might be wrong on such issues as the emergency use of Dieldrin under specified conditions against Desert Locust nymphs. In short we cannot afford to be arrogant and ignorant. I believe Reg. 16 should be followed, but that it provide sufficient room to move to make intelligent compromises. Again, this question of pesticide use would require a subcommittee type of approach, providing a forum for the

international experts to get together and hash out some policy recommendations. Burkina Faso: W. H. Settle

- The USG (EPA) often has an extremely self-righteous attitude towards pesticides. That was evident during the 1986 grasshopper outbreak. We wanted Malathion, the French wanted Fenetrothion. Chemically, there is very little difference. Both are extremely efficacious. Fenetrothion is slightly more toxic and more persistent, but is still considered fairly safe. Both are broad spectrum, and are certain to have a negative effect on non-target organisms, including beneficials. Our influence on the selection of pesticides should be in assisting the host countries in developing pesticide legislation. Pesticide legislation, modeled after European or U.S. standards (I don't believe there is much difference) would solve many of the problems. This is an activity in which the FAO could take the leading role (if they haven't already done so). Senegal, Mauritania, Gambia: B. Overholt
- The Sahel's climatic conditions are rather harsh and consequently, conservation time is important. Therefore, the U.S. Government should take these conditions, as well as the inability to carry out treatment of reinfested zones, into account. Mauritania: Tahara Galledou
- By information exchanges on pesticide registration and cancellation; not to pay for products known toxic to humans, animals, and/or harmful to environment; USAID and most countries should cooperate in the procurement of pesticides; they should discuss the advantages and disadvantages of different products; so could apply legislative measures already in place. Chad: Ngaromillet Michel
- These efforts should be reinforced in particular by the determination of standards for this evaluation of environment. Burkina Faso: Gana Diagne
- Not only maintain but even redoubled; in this respect, a system of criteria needs to be developed (if this has not been done). Ouagadougou, Burkina Faso: Peter Dettmar

2. Are the present efforts in environmental assessments adequate and should they be continued into the future?
- Specific funding and technical assistance should be provided to each host country to develop environmental and efficacy assessment capabilities. Senegal CPS did an outstanding job of efficacy evaluation and could have done an adequate environmental assessment if funds had been available. Senegal: E. Huddleston
 - The present environmental assessment now in process appears adequate to me. If future sizeable grasshopper-locust programs are undertaken, it would seem that limited assessments should continue but not to the scope of the present one. Niger, The Gambia: C. M. Voss
 - I do not believe you can conduct an environmental assessment, once operations have begun! Known impacts by analogy, will have to be transferred to the host nation, i.e. as we did in Senegal in '86 to "get going"! Senegal, Mali, Burkina Faso: R. G. Adams
 - Yes and yes. Sudan, Mali: G. A. Schaefers
 - Yes. F. M. Philips
 - Environmental assessments are needed now and in the future to identify human health risks and environmental impacts of the program. Chad: P. W. Orr
 - Good environmental assessments ought to be an integral part of any project, especially where the impact will be significant as in an insect control program. I am not familiar with the adequacy of past environmental assessments of pesticide application in Africa. They should be conducted in the future.
- No opinion as to the adequacy of USG efforts. However, regardless of present efforts there should be a continued effort in the field of environmental assessment. I suspect that this may not have too high a priority at many levels of the in-country administration down to the village level. Only when one is eating well can the surroundings begin to take on more importance. Senegal: K. Seethaler
- USG should continue to strive to improve the assessment of potential environmental threats resulting from pesticide use projects. Mali: L. Yarger
 - No, they are not adequate, and yes, they should be continued.
 - I'm not completely familiar with what is going on as far as environmental assessment. Are Edwards and Huddleston continuing their program? Regardless, this type of activity should continue. Senegal, Mauritania, Gambia: B. Overholt
 - Not only continued but increased. Mauritania: W. B. Thomas

- I have not seen any of the results of current efforts in the area of environmental assessments. Burkina Faso, Niger: C. Kelly
- Not done in the Gambia - should be emphasized in future. The Gambia: A. Laurence
- These are enough and certainly need not be continued. Niger: M. Germaux
- I feel environmental monitoring is overlooked and is important if a pest control strategy of any long term benefit to a country is to be developed. The Gambia: A. McKenzie
- In Chad, environmental assessments are particularly nonexistent after chemicals are used. Environmental assessments should be financed by those donors which have provided chemicals and should be carried over for a few years after application of chemicals. Chad: USAID
- With my 15 years experience in Mali, Chad, Nigeria, and Camerouns, no serious works have been yet carried out on the effects of pesticides applications to the environment. These must be done urgently in view of the recent trends in pest evolutions and massive allocation of pesticides. Chad: J. E. Ohabvike
- It is an area of importance that should be supported. Ethiopia: USAID
- Everyone agreed that present efforts in environmental assessment are inadequate and should be continued into the future. One said studies should be directed at a range of insecticides on non-target species. The environmental assessment conducted this year was only the beginning of what should be a larger effort in Sudan. Sudan: GH/L Program
- Efforts are inadequate and need to be continued. In-country capability is not currently available in Guinea-Bissau nor will be for some time. We are depending on results from 1987 AID contract elsewhere as a guide. Assistance is needed. Guinea-Bissau: J. A. Franklin
- Present efforts in environmental monitoring in Africa are inadequate. Improvement in this regard requires long-term fundamental strengthening of local institutions. There is a future need of the U.S. EPA to establish collaborative programs with host country research institutions. Mali: USAID/Bamako technicians
- For the Sahel, where survival conditions are very important, the environmental problem is considered second or third in importance. It is good to encourage this initiative, but major problems remain, for example, protecting the few projects that we have been able to realize despite insufficient rainfall and inadequate water supplies. International assistance is more than necessary. Mauritania: Tahara Galledou

--- Not sufficient. Some developed countries doubt the concerns about the active ingredients known to be harmful to the environment. Keep same status. Chad: Ngaromillet Michel

3. Given the fact that almost no african countries have established environmental regulations and procedures, should the USG promote the preparations of such documents? To what degree can and should this be done? Who specifically should assist? Should the major donors seek UNEP or FAO involvement/assistance? How can we insure compliance?
- USG should promote a uniform, basic set of guidelines in cooperation with other donors with FAO and UNEP involvement. These should be simple, straightforward and not too restrictive. Compliance may best be obtained by funding a very small, specific project of annual activities and reporting. Senegal: E. Huddleston
- For the USG to get involved to promote environmental regulations, this has the potential of a very sensitive issue. There could be the tendency of the U.S. Government or institutions wanting to impose USG established environmental regulations on African countries and a differing environment. UNEP and FAO suggestions in this regard should be checked and they should be involved. How can compliance be assured when a people's livelihood or like and death decisions are at stake (situations which never occur in the U.S.)? Training and information from USG could be a starting point and to get African governments to want environmental improvement. Niger, The Gambia: C. M. Voss
- This is "a complex and multi-faceted question ('loaded?')".
- a. Through normal AID programs, USG should be able to provide guidance for environmental protection - I believe the host nations are interested in this area.
 - b. Ideally, it would be good to seek UNEP and/or FAO assistance. "The real world" indicates that both may be now so politicized/polarized that assistance is impossible. Witness the very poorly managed FAO program!
 - c. We must have some degree of faith in the host countries. Ultimately, if they don't comply with their own rules, we would have to cut off financial material assistance. Senegal, Mali, Burkina Faso: R. G. Adams
- The USG has already taken a stance in advocating environmental regulations. It is essential that USG offer assistance on the design and enforcement of such regulations, if invited to do so. Such assistance should be provided by USAID S&T, USEPA, WHO, FAO and appropriate technical assistance from the U.S. I don't see how we can assure compliance except through restrictions in the provision of selected pesticides and even here there are no guarantees. Sudan, Mali: G. A. Schaefers
- In-country Plan Protection personnel have to be trained in environmental assessment techniques, even at the most elementary level. Outside experts from FAO or USG would have to provide the necessary training in-country and/or in the U.S. Chad: P. W. Orr
- USG promotion of such documents: Many African countries have no regulations relating to pesticides and their use, or many have the

regulations but no way to implement them. It appears that any environmental regulations should be an integral part of overall requirements for safety in use, purchase, and disposal of pesticides and other toxic substances. The USG should promote these regulations since they must be an integral part of any plant protection division of a Ministry of Agriculture.

The degree of preparing such a document will depend upon the existence of, or the level of development of, a host country crop protection service. The main item to establish is what type of environmental regulations are to be considered. What is the target area, i.e. preservations of non-target and beneficial organisms, protection of groundwater, contamination of soil, water or air?

Who should assist? Again the legitimate representatives of major chemical-pesticide producers should be involved along with academic and governmental specialists from U.S. and donor countries. This would have to be on a country by country basis depending on the crops and areas to be treated. Major donors should be involved directly and through FAO since it will ultimately be the donors who will have to comply with any regulations established and implemented. Although the host country teams will be applying the pesticides it will be the donors who will be supplying the materials, equipment, and training for the application of the chemicals.

Compliance could be obtained, in part, by withdrawal of support in the event of non-compliance. I doubt if total compliance, although desirable, is feasible. It will be an internal affair. The USG could only withdraw if in disagreement. Chad, Niger: J. J. Drea

- Health risks to humans should be assessed and documented. These assessments should be made available to decision makers so that informed decisions can be made. Mali: L. Yarger
- These peoples are starving. I don't think they care about environmental regulations or compliance. Mali: S. Tunnock
- Host country environmental regulations? -- Again, the U.S. would do well to be the advocate for such an effort, but use the exercise to promote the decision-making abilities of the within-country international coordinating groups. After all, we cannot presume to legislate another country's policy, nor can we ensure compliance, we can only help the country become self-empowered to legislate its own affairs. Burkina Faso: W. H. Settle
- See Question 1 above. This would seem to be a perfect role from the FAO. Is it for us to insure compliance? Senegal, Mauritania, Gambia: B. Overholt
- Yes, documents should be prepared and environmental concerns should be expressed in regard to pesticide manufacturing, safety and disposal. Implementation must be a joint process, involving both a multilateral donor contingency and the host country itself. If possible, FAO and UNEP should be involved in this. As far as

compliance goes, stipulations can be set in regard to continued donations in other matters. This is already being done with the policy of no donations when pesticides are used that have been banned in the U.S. Senegal: E. Huddleston

- Yes. The USG should support an FAO managed multi-donor effort in this area. This effort should include representation by international organizations concerned about the environment. Representation by major pesticide producers should also be considered. Niger, The Gambia: C. M. Voss
- Yes. EPA, UNEP/FAO involvement/assistance might be useful. (I don't know their capabilities at the moment.) Senegal, Mali, Burkina Faso: R. G. Adams
- No, this should not be encouraged. No FAO or UNDP should not be asked to assist. This should be done through the local structures only. Sudan, Mali: G. A. Schaefers
- The Sahelian countries need assistance to protect their crops and to control predators and not to protect the latter. The Sahelian ecosystem is currently not threatened in any way. I feel that it is quite dangerous for European or Anglo-Saxon ecologists who are ignorant of African problems to come and sow seeds of confusion and fear in this area.

If there are any energy resources to be exploited, this should be directed towards aid for development and agricultural production. Environmental problems are secondary issues - and even very inappropriate in a situation where famine is more and more frequent. No locale: F. M. Philips
- Only by training most staff through a unit set up and run by MOA. There is scope, but should be done within the MOA and given good TA assistance.

Gambia currently has an environmental unit although it does need TA in areas of pest management and pesticide technology to prevent sensationalism. Chad: P. W. Orr
- As long as GRC expresses interest, the implementing agency, crop protection, should publish safety guidelines with assistance from FAO experts. USG cannot ensure, only counsel, compliance. Cameroon: J. Dorman & M. Lang
- Yes, to be taken up at an international meeting.
- Taking into consideration the ability of each country's ability to comply; FAO; by educating the crop protection personnel and decision makers. Cameroon: S.Njymian
- If environmental regulations are to be established within a reasonable time frame, AID should promote the preparation of such documents. If the task is passed to a multilateral organization, it

is unlikely that action will be taken quickly. The U.S. has the best environmental control in the world. Thus, AID should be leading the way. Chad: USAID

- It will be a welcome idea if USG could promote preparation of such a document. This could be done on sub-regional levels but with emphasis as might interest each particular country. Agricultural universities and higher institutions, ministries of agriculture and regional experts, plant protection and environmental sanitation officials may be involved in each country. FAO participation in such a venture is, of course, very essential. Chad: J. E. Ohavike
- Regulations that could be used in Chad. Chad: V. Diefenthaler
- FAO must be involved and the economic cost of improved safety and environmental procedures must be assessed best to operate through the UN. Ethiopia: USAID
- One respondent said the USG should promote preparation of environmental regulations and procedures with the assistance of the National Council of Research, UNEP and FAO assistance and the input of any active local organization. Symmons of AOI said, "I don't think any commercial company would issue a policy." Compliance with regulations may be answered by controlling importation of chemicals. Compliance with pesticide regulations requires an active national bureau mandated to monitor pesticide use and environmental hazards. Such an endeavor would require large sums of money, which many countries can ill-afford at this juncture. An international body such as the FAO or UNEP should in principle be closely involved in the development of such regulations with substantial support from the donor community in general. African countries must also insist that importations of pesticides should be restricted to those considered to be environmentally safe. Sudan: GH/L Program
- No. Generally believed to be only a paper exercise. Only has merit on a selected basis where donors/countries are seriously prepared to also establish a capability (staff, laboratory) to monitor and will enforce at highest level. Better off spending money to identify what country(s) might be prepared to be serious with available funds/resources to support a long term project. And then support the most likely to establish/prove a model for others to follow when conditions merit. Otherwise sampling/testing by donor sponsored FAO teams is probably more appropriate/accurate/reliable/cheaper. Guinea-Bissau: J. A. Franklin
- In accordance with our recommendation in question 2 above, these regulations and procedures could be the product of a long-term collaborative relationship. Promulgation of document and regulations without local participation, awareness, and application would be difficult. Any effective procedure and regulations will require fundamental changes in the local attitudes. Recent experiences in the U.S. concerning environmental issues support this position. Mali: USAID/Bamako technicians

--- Yes. FAO already has a code of conduct. The application of this code must be monitored. Mali: S. Sountera

--- USAID should encourage meetings between African experts by organizing conferences and seminars to inform participants about the harmful effects due to the lack of a code for good conservation of the environment; USAID should help establish the code. This is possible within existing subregional institutions of the United Nations systems (UNDP, FAO, WHO). Chad: Ngaromillet Michel.

4. How can we clarify AID position (i.e., Reg. 16) on environmental concerns for Action officers?
- Edit all cables, papers, etc., into a simple set of guidelines, a few pages. Senegal: E. Huddleston
 - Unfortunately, the "AID position" will have to be written into the AID policy and guidance manual. Then, internal compliance will have to be monitored by the AID/OIG internal inspection procedures ("Normal bureaucracy"). Senegal, Mali, Burkina Faso: R. G. Adams
 - USAID must develop a clear but reasonable policy on pesticide use policy as it relates to environmental concerns. Such a policy is presently only understood and not clearly stated. Sudan, Mali: G. A. Schaefers
 - Minimum environmental guidelines could be prepared for Action Officers at the various stations. Some of this type of information could be prepared by USDA Forest Service and APHIS. J. A. Henderson
 - Concern for the environment should be unequivocal as it is national policy. The question may arise where there is an emergency that can't wait for the time it takes to make an environmental assessment. This sort of situation would likely have considerable precedent, in which case the precedent situations should be examined. To the extent possible, there should be some incentive to anticipate the need for assessments. Waivers of environmental assessments associated with pesticide applications should not be routinely granted. One hesitates to say never, but it should be almost never with plenty of scrutiny placed on the exceptions. Senegal: K. Seethaler
 - This aspect would have to become a part of any discussions, negotiations, or agreements at the onset of a program. This would have to be made clear and evident not only to the host government but to the other donors as well. There would have to be a realistic approach and not an attempt to impose aesthetic U.S. beliefs on people who do not have enough to eat. Chad, Niger: J. J. Drea
 - Clarify Reg. 16 for action officers? -- As in above (V,1), we need to come to terms with certain key issues, such as Dieldrin use, and this is best done in an international forum. THEN, action officers can be provided with a current policy line for action. Reg. 16, by itself, is insufficient for action because it is a document in need of interpretation to the specific uses at hand. This requires technical, administrative and political judgements to be made. The international community needs to be consulted before these judgements are decided upon. Burkina Faso: W. H. Settle
 - No idea, I certainly had a difficult time understanding USAID's position on pesticides. Senegal, Mauritania, Gambia: B. Overholt
 - Perhaps you should reissue Reg. 16, as we do not seem to have a copy of it here at the Mission. However, I gather it states that no

pesticide may be purchased or used in connection with USAID funds that has been banned in the U.S. Thus, we follow that regulation in control operations. This has drawn fire, especially in connection with the use of Dieldren for Desert Locust control. Several Locust consultants from other donor organizations have argued that band treatments of Dieldren are less environmentally destructive than full area coverage with a pesticide like Malathion or Fenitrothion.
Mauritania: W. B. Thomas

- Provide training for action officers (and key contractors) on Reg. 16. Materials explaining the regulation should be circulated to top level personnel in each Mission, and in appropriate language, to the host government. Training sessions for AID staff should include clear, written guidance on how to advise the host government of the regulations, how to get a waiver and how to advise the host government they may, or have, violated the regulation. Burkina Faso, Niger: C. Kelly
- y --- By publishing simple procedures on use, handling and storage to address problems of high potential. Cameroon: J. Dorman and M. Lang
- In holding informational and organizational meetings. Cameroon: L. Soumare and A. Giner
- Information/educating 3rd World Countries. Cameroon: S. Njymian
- This could be incorporated into training programs. Chad: V. Diefenthaler
- By providing action officers with brief background documents on Reg. 16 and on specific pesticides and their deleterious effect on the environment.
- We recommend that AID positions on Reg. 16 be published periodically to show any changes and interpretations since they are frequently debated. These regulations should, to the extent possible, be published in the official language of the host country. The recent AID/World Bank memorandum of understanding on pesticide uses should be transmitted to host country CPS. Mali: USAID/Bamako technicians

VI. EMERGENCY MANAGEMENT AND LOGISTICS

1. What are the criteria for making the transition from the Mission's normal management system to an emergency management system? How can the mobilization and organization for emergency operations best be accomplished?
 - The seriousness of the situation dictates the transition. This Mission has one Locust Control Officer and an assistant. In times of emergency both officers would be on call. During normal non-emergency conditions the assistant takes the lead. However, O&E limitations present serious constraint on future response capability. Cameroon: J. Dorman and M. Lang
 - Don't know since not fully acquainted with AID procedures. Cameroon: S. Njymian
 - Implementation of emergency projects is always given top priority by USAID/Chad. Required technical staff are assigned to work part-time on the project. However, the emergency project consumes much time even when USAID staff is assisted by short-term technicians. Monitoring and control efforts on the ongoing development program is jeopardized. Chad: USAID
 - Personally, I see no yard stick for such a decision but this may depend on the potential of each country which, of course, should be determined by your country representative, perhaps in consultation with the coordination and technical committees in each country with due consideration, of course, to the evolutionary trends in pest population dynamics. Though it is now common to give direct bilateral assistance to deserving countries, my experience shows that better management control was achieved by the former methods of channeling aid through FAO who, in turn, is accountable for money and materials received and remitted to deserving countries. With donor government dictating to FAO now aid is to be portioned. Chad: J. E. Ohabvike
 - Provide outside assistance. Germany Embassy, which does not have the required expertise, brought in an entomologist for the emergency program. Chad: V. Diefenthaler
 - The criteria would be the presence of an alarming pest situation in a given country. Mobilization and organization can best be accomplished by establishing a steering committee. Normal management system must always remain prepared for emergency management by maintaining adequate capability in survey and control inputs. Mobilization of local inhabitants and farmers by distributing ground control requirements and through awareness. Mobilization can best be accomplished by using FAO as a focal point (as in 1986 and 1987). Ethiopia: USAID
 - A few people thought this could be done by helping PPD in transportation, stores and stores management, establishing a new section in the pesticide inspection section and through local and

overseas training for PPD staff. Other respondents suggested strengthening the already established PPD pesticide inspection, locust control and logistic sections and amending the agreement with GOS with specific terms of reference. Sudan: GH/L Program

- Generally based on who is available. In Guinea-Bissau administrative issues held up most procurement for 90 days. Anything will be better. Best to TDY an appropriate 2-person team composed of administrative/technical types, if not locally available. Guinea-Bissau: J. A. Franklin
- The criteria as the Mission views for making the transition from the Mission's normal management system to an emergency system, is the need to accomplish a specified set of objectives within a limited timeframe. These activities, if not accomplished, would otherwise render the host country in an unmanageable situation resulting from acute and/or chronic damage due to several incidences i.e., grasshoppers, yellow fever, drought, and famine. The objectives must be accomplished along with normal Mission operations, requiring additional staff, finance, communications and logistics. Mission recommends minimal diversion of program staff to manage emergencies. Mali: USAID/Bamako technicians
- Matter for further clarification. Mali: S. Sountera
- The magnitude and timetable for a change from normal to emergency operations depends on the scale and nature of the emergency, capacity of the USAID Mission and counterpart host organizations and the complexity of the response. The following paragraphs summarize the transition process which should be adapted to the conditions in each country.

The transition from normal to emergency management should take place once it has been determined by the Mission that there is the need for special assistance. This should be very early in the emergency to ensure adequate planning precedes requests for assistance and program implementation. The early assessment and planning can be developed through the use of existing Mission staff, but priority consideration should be given to the need for additional staff.

As quickly as possible, the emergency program should be established as a separate function within the Mission's operating structure. Whether the office is staffed with seconded regular personnel, new staff, or a mixture, this administrative separation is critical to ensure priority is given to program needs and direct and rapid access to top management is available for decisions and communications.

The actual emergency program mobilization process requires three components:

 - Availability of a basic operations plan (pre-existing or specifically written for the disaster) and subsequent detailed response program;
 - Correct and detailed understanding by mid and top management of the nature of the problem, magnitude of the impact and range of appropriate responses; and

- Timely allocation of staff (existing or new), resources and support for the implementation of a response program. Burkina Faso, Niger: C. Kelly
- Request from country. Confirmation by FAO or US TA's mobilization and organization best accomplished by formation command center with local staff plus TA's. The Gambia: A. Laurence
- By a committee under the CPS. Niger: F. Boillargeon
- Emergency needs careful confirmation by experts in the field; together with assistance in procurement of correct/sufficient inputs. The Gambia: A. McKenzie
- The procedures used by AID/Dakar worked well. Senegal: E. Huddleston
- (a) This criteria would probably start with the declaration of an emergency by the U.S. Ambassador and AID Mission Director.
(b) Modify and implement the National Interagency Incident Management System (NIIMS) and its Incident Command System (ICS) operational management tool. This was used successfully in the Senegal 87 program. Expertise and training materials and operational documents are already available to do this. Senegal, Mali, Burkina Faso: R. G. Adams
- Not qualified to comment on criteria. However, it is my understanding that the coordinating committee approach has been successful in several if not all instances. Sudan, Mali: G. A. Schaefer
- When survey entomologist determines that control operations (beyond host capabilities) are required, emergency operations should take over from Mission's normal management. F. M. Philips
- The transition should probably be made when biological information indicates a need for controlling the pest. The threshold for this discussion would probably vary country to country. Need for mobilization probably should be indicated by Mission personnel. USG response should be coordinated by OFDA by drawing on other USG agencies. International response probably should be coordinated through FAO. Chad: P. W. Orr
- Statement of Objectives. Clearly define the objectives and budgetary limitations as early as possible. These may be modified as the campaign unfolds if the original perceptions are nebulous.
Planning. A plan of action designed to achieve the objectives of the campaign should be prepared. Areas of expertise and all personnel requirements need to be determined and specific responsibilities assigned. Planners should become generally familiar with the life history and ecology of the target species. Material requirements, from pesticides and application equipment to maps and office machinery, should be carefully estimated, taking into account that some of these items will be in current inventory and others must be purchased. A budget must be prepared. Logistical procedures for the

procurement, storage, inventory and maintenance of supplies and equipment must be determined. Airplane contracts, environmental assessments, permits and information concerning local customs and formalities, health and safety precautions, all that is required for an effective operation, need to be outlined at the beginning and refined as the strategy unfolds. Given the unpredictable turns of events, contingency plans adapted to several conditions of outbreak should be prepared.

Lead Time. Preparation can greatly reduce the chaos inherent in emergency management system: early involvement, strict timetables, continuity of effort. The orderly negotiation and purchase of supplies and equipment is best facilitated when the timeframe is in your favor and you have the greatest choice among suppliers and modes of transportation. Area familiarization, contract familiarization, and rehearsal of operational procedures all take time and pay big dividends in meeting objectives while holding down costs.

Operations. As operations proceed, the plans may need to be modified. At the same time, efforts should be made to standardize procedures. A watchdog is needed to control expenses. An operations manual should be prepared and revised as good operating procedures get defined. It will serve not only this campaign, but others as well since it should be assumed that similar emergencies will recur in the future.

Certain aspects of the operation require special consideration. Some of these are singled out as follows:

Personnel. The hiring of additional people for the office and the training of CPS employees in the field will serve to reduce the impact of the emergency on other Mission activities. Job descriptions should be defined as precisely as possible for everyone involved in the emergency.

Communication. Personal contact by those who are coordinating the control program with: those who administer control in the field, those who supply the pipelines, Mission resource personnel, government agencies and performance contractors is a requirement for smooth operations. Lines of communication must be cultivated. Electronic transmission of information must be improved with effective radio transceivers and relays augmenting an inadequate and expensive telephone system.

Transportation. The ability to move about to obtain information and execute operations is essential to an orderly operation. It should be anticipated that additional mobility will be required in times of emergency. Vehicles should be made available to address this need. Adequate supplies and availability of fuel should be planned for; fuel is expensive and cannot be assumed to be available everywhere. The need for additional maintenance should be anticipated.

Logistics and Contract Administration. Everything depends upon the timely placement of material in good usable condition. Good logistics requires uninterrupted attention to detail. Contract operations, especially those involving aircraft require close supervision. If they are handled professionally, the disruptive impact on normal Mission activities can be minimized. Senegal: K. Seethaler

- If the country has to request assistance for an emergency before the transition takes place then it may be advisable to redefine "emergency." An emergency had long existed in Chad, for example, before the grasshopper outbreak occurred. The emergency was that Chad had no crop protection service capable of meeting any field outbreak of a pest organism. Consequently an "emergency" may be defined as a condition that exists, or a lack of capability is present, that would not permit a country to react to a physical emergency. A city without a fire department already has an emergency. A fire only confirms the existence of the emergency. Therefore, if a country has the normal established organization necessary to provide for the well being of its citizens an emergency does not exist unless these organizations are unable to meet a crisis. Then there is an emergency. If the organization itself is absent or poorly developed that, in itself, is an emergency. Mobilization and organization for emergency operations might be accomplished through the receipt of status reports from USAID Missions, U.S. Embassies, or FAO offices in the countries indicating the potential or actual development of a crisis. Chad, Niger: J. J. Drea
- Most nations' requests are based on FAO recommendations. AID should concentrate on getting its views known and before FAO at both the technical advisory and donor meetings. Firmness with respect to the U.S. position may be necessary to exert the necessary influence. Senegal: G. E. Cavin
- Criteria should include biological data that indicates USG involvement in a pest management activity and the need for a Mission's activities and expertise to be focused on a particular function. Mobilization and organization can best be accomplished by relying on USG agencies and contractors with expertise in the activity to be carried out. Mali: L. Yarger
- It is a measure that should also contribute to the strengthening of these resources and it should be the concern of all--the USA, other donors, and recipient governments. Mauritania: Tahara Galledou
- Response to the disaster is the mobilization of all resources and energies in a short time, considering the establishment of a new management structure different from the existing one.
- To face a disaster situation, it is critical to have a better institution, at the national level, which will be capable of identifying the disaster and to designate responsible people to control it. Members of the disaster institution should be able to put together control strategies and each member should have well defined roles. Permanent evaluation of intervention based on a good and efficient network of information. Chad: Ngaromillet Michel.
- Put at the USAID level an office of information with the list of suppliers, their telephone and telex and the type of equipment provided. Burkina Faso: Gana Diagne.

--- Put at the disposal of host countries all useful information available. Ouagadougou, Burkina Faso: Peter Dettmar

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2. How does USG assist Crop Protection Services in maintaining an adequate inventory of in-country resources and safeguarding USG interests?
- USG, through FAO, provided two experts to crop protection service in this role. Cameroon: J. Dorman and M. Lang
 - Don't know. Cameroon: S. Njymian
 - USAID/GOC grant agreement provides general guidelines for control of pesticide and fuel stocks in field depots. In addition, USAID contract technicians were required to work closely with Extension Service and inspect stocks. Contract technicians and aerial treatment contractor were also required to keep detailed records on use of pesticides and fuel. Chad: USAID
 - First by ensuring the existence of good storage facilities. By ensuring the presence of a good competent and well paid storekeeper. By regular participation of USAID staff in meetings of the technical committee. By liaising with FAO consultants through the USAID representative and FAO Headquarters. Chad: J. E. Ohabvike
 - By sending Mission consultant whose objective would be (a) to gather information regarding pesticide stock levels in the country, (b) to determine the amount of usable pesticide for crop protection purposes, and (c) to prepare a follow-up project for disposing of unwanted pesticides. Ethiopia: USAID
 - Since the 1984-85 drought, the GDO office has assumed responsibility for all food related disaster work in the Mission. In the case of locusts, the GDO took the lead early on due to the reduced personnel at post during the 1986 evacuation. In normal times, such a problem might have been initially managed by the Agriculture Office with GDO copied for information on all developments. As a problem develops into a potential emergency, the Agriculture Office would transfer the action to the GDO. A case in point here is the rat infestation, which began as an Ag. Office action and ended in GDO as the emergency situation developed. Within the Mission, emergency management is furthered by notices from the Director indicating that an emergency program is in operation requiring the urgent assistance of other affected offices (contracts, CMO, etc.). The creation of the Disaster Preparedness Committee in the case of the current food situation in Sudan is an indication of how the Mission can move into emergency management mode. Sudan:GH/L Program
 - In Guinea-Bissau, USAID Project 657-0012 works directly with CPS. This has helped anticipate resource needs and safeguard environmental and other issues/interests. This is done through discussions, on-site visits and direct impact on procurement/use. Guinea-Bissau: J. A. Franklin
 - This objective can be accomplished by ongoing Mission bilateral collaboration with CPS in addition to increased multidonor collaboration. Mali: USAID/Bamako Technicians

- Assuring a pest control organization can maintain and manage its resources, and is able to implement adequate pest management programs, is a development activity. Where AID has pest control development projects, these factors, as well as emergency management training, should be integrated into the project. Where there is no development project base, AID must rely on periodic contact with pest control organization and monitoring of pest conditions in the field (FEWS, complementary projects and/or regular Mission agricultural reporting). Burkina Faso, Niger: C. Kelly
- Proper training, responsible storekeeper; for safeguarding USG interest, send out TA. The Gambia: A. Laurence
- The donor countries do not seem to have a clear knowledge of the real needs of the host countries. Niger: M. Germaux
- This year USAID did as much as possible. Information needs to be transmitted to all donors to prevent over-ordering of inputs already present. The Gambia: A. McKenzie
- The Mission should provide encouragement and TDY assistance if needed to help CPS prepare an annual Action Plan before the end of December each year. The 1987 Action Plan is a good example but the 1988 Action Plan should be completed earlier and should include all pests. Senegal: E. Huddleston
- Providing donor country consultants early in the year, as done in 1987, and acting on their recommendations should cover these requirements. Niger, The Gambia: C. M. Voss
- "Guidance" and "leadership." Senegal, Mali, Burkina Faso: R. G. Adams
- Provide technical assistance to Missions who may then operate via the coordinating committees. Sudan, Mali: G. A. Schaeffers
- Possibly with a U.S. technician assigned (long-term) for this purpose. F. M. Philips: J. A. Henderson
- This is a delicate issue. The GOS doesn't have an inventory and maintenance system designed to meet the requirements of this and future campaigns. The disposition of equipment (e.g., vehicles) provided for the campaign may be assigned to other uses at the end of a given year's activities. To insist that supplies and equipment be reserved for specific purposes is apparently interpreted as an act of interference. What USAID might consider is a training program and an advisor on warehouse techniques. Students could be sent to the U.S. for training in such skills as small engine repair in order to maintain the existing equipment inventory. Senegal: K. Seethaler
- Possibly through a centralized service office at the headquarters of the crop production service. This office would be responsible for supplying the necessary resources to the regional/departmental

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centers which, in turn, would supply the local action groups. Periodic inventories would be taken with special emphasis on supplying the centers and local groups prior to the onset of weather conditions that would hinder or prevent the normal restocking of expended material. Periodic on-site visits by CPS inspector and USAID official to verify inventories and stocks would help safeguard U.S. interests. Chad, Niger: J. J. Drea

- More pre- and post-treatment evaluations are needed along with longer term evaluations of the more persistent pesticides. Environmental evaluation should be an integral part of any. Senegal: G. E. Cavin
- Through training of in country persons responsible for activities in pest management, and frequent coordination meetings between all agencies and countries involved. Mali: L. Yarger
- What USG interests? Geopolitical? Again, I'm not certain of what you're referring to. I believe that it's in the best interests of the host countries to have continued year round support, both technical and financial, of crop protection services. This is the one way the USG can influence and keep attuned to crop protection issues in each country. Maintaining an inventory is only a small aspect of this. To really accomplish something takes a long-term mutual effort on the part of the donor and the host country. Senegal, Mauritania, The Gambia: B. Overholt
- The U.S. Government should be the driving force behind organizing seminars, meetings, and other symposiums for determining these needs. For this purpose, it can organize assessment Missions at the end of each crop year, which could take place around the end of December or at the beginning of January, because during this period other ravagers are still potentially dangerous. Mauritania: Tahara Galledou
- Yes, but USAID interests should not be protected especially. Ouagadougou, Burkina Faso: Ngaromillet Michel
- Communications between USAID Mission and FAO Representation in Burkina Faso have been excellent.
- We also note that communications between Rome USAID Missions and Ouagadougou have been excellent (but USAID Ouaga is in better position to judge of it). Much information on events taking place at Rome on the locust situation being transmitted to us by this channel before we receive any information on behalf of FAO headquarters.
- FAO representation receives regularly PRIFAS bulletins.
- FAO representative in Burkina does not receive published bulletins by the regional organization of locust control which send their signaling directly to FAO headquarters (AGP/ECLC).
- The representation receives by telex ECLC locust signaling bulletins which are distributed to the Director of Agriculture, to the Resident Coordinator of the United Nations System and to USAID. Burkina Faso: Gana Diagne

3. What should the role be of the USG to ensure that annual operational plans are drafted and anticipated needs and available resources are accurately identified?
- USAID coordinated with FAO and other donors in urging crop protection. Department of Ministry of Agriculture to act in light of the facts. Cameroon: J. Dorman and M. Lang
 - In asking the Ministry of Agriculture. Cameroon: L. Soumare and A. Giner
 - Involvement of host country in the identification of needs. Cameroon: S. Njymian
 - USAID/Chad played a major role in the organization of the GOC technical committee and in pushing for the development of operation plans, allocation and distribution of pesticides, assessing needs, and calling for meetings when needed. USAID was clearly the most active donor and predicts it would have to do the same if future emergencies arise. Chad: USAID
 - By insisting on end of campaign meetings of evaluation and active participation of USAID program officers in such a meeting. By direct liaison with FAO, who will mandate its national coordinators to this effect. By active participation of USAID in coordination committee meetings in country. Chad: J. E. Ohabvike
 - USG should work with other donors and GOC Committees just as it did this year. Chad: V. Diefenthaler
 - Coordinate with national and regional organizations. Ethiopia: USAID
 - Only one person responded to this question saying that the USG should play the role of overseer by calling meetings and making field visits. Mission is active member of multidonor steering committee which solicits action plans and reviews anticipated needs and available resources. Sudan:GH/L Program
 - Provide active participation by knowledgeable, technically trained, experienced plant protection managers who don't have a profit motive or future contracts in mind. Establish a model to assure standard format to expedite tabulations and comparisons. Guinea-Bissau: J. A. Franklin
 - USAID/Bamako in the past has played a seminal role in multidonor collaboration in assisting the GRM-CPA with its annual operational plans. Through T.A. we have assisted the FGRM to accurately identify the problem and estimate resource requirements to carry out its control operations. As a result of early and effective planning of the 1987 campaign, the GRM effectively treated over 400,000 ha from their estimate of 530,000 ha. Mali: USAID/Bamako Technicians

- The continuation of annual activities with the Crop Protection Services. Mali: S. Sounera
- The management ability of the Crop Protection Service is the key to assuring USG financed resources are properly maintained and used. Management training is, thus, a priority activity in both disaster and development activities. Similarly, clear and concise instructions and training are required to assure USG pesticide regulations are followed even after the end of direct assistance. Improvement of a crop protection service's ability to plan and respond to seasonal pest problems can be developed through training in the basics of emergency management and the development of an oversight emergency planning function within the host government. The former is a medium to long term development activity which has impact on the year-to-year ability of a crop protection service to respond to critical problems. The latter action is a part of developing a disaster response capacity within a host government and is a short to medium disaster preparedness activity. The latter complements and shores up the former. Burkina Faso, Niger: C. Kelly
- Send TA in March. The Gambia: A. Laurence
- Without meddling. Niger: F. Boillargeon
- By logistical recommendations based on previous years' experience. The Gambia: A. McKenzie
- "Guidance" and "leadership" plus model plans and systems, i.e., ICS. Senegal, Mali, Burkina Faso: R. G. Adams
- Donor assistance should be contingent on completion of such operational plans. Sudan, Mali: G. A. Schaefers
- Advisory. F. M. Philips: J. A. Henderson
- Contingency plans for all countries should be prepared by FAO. These plans should consider all alternative control methods, identify in-country resources needed, and identify needs for insecticides and equipment. USG could prepare generic aerial and ground spray plans and equipment needs before an emergency develops. Chad: P. W. Orr
- It would seem that the simplest way to accomplish this would be for the USG to prepare contingency plans and assess needs and available resources on its own as early as possible so that it would be prepared when a coordinated plan of operation is required. This gives the USG an opportunity to plan for its own best interests and will require the services of only a few people well in advance of any operational requirements that may materialize. Senegal: K. Seethaler
- Again, funding of the program should be contingent on receipt of timely reports and plans and comprehensive inventories of existing and needed supplies. This could be tied in with an annual on-site visit to the warehouses and field storage facilities. Chad, Niger: J. J. Drea

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- Provide leadership early in the planning process. Long-term technical and financial assistance. Someone working with the director of crop protection on a daily basis. Mauritania: W. B. Thomas
- By reason of the organization set up at the beginning of the crop year, a concensus should be reached between donors and recipient countries to determine the composition of the assessment team, but it should be understood that donors have more authority. Maruitania: Tahara Galledou
- To create a mechanism by which the national institution will be integrated in the project implementation with possibility to have evaluation teams assess the project progress. Chad: Ngaromillet Michel

4. What changes need to be made in the aircraft contracts to ensure acceptable performance in terms of efficiency, costs, and safety?
- Donor community has urged GRC to undertake study of its aerial spraying unit. Study has not yet been conducted. Cameroon: J. Dorman and M. Lang
 - Changing the personnel. Cameroon: L. Soumare and A. Giner
 - It is preferable to contract directly with experienced private companies. Chad: USAID
 - (A) Duration (time) of contract should be prolonged in such a way as to enable smooth operations to cover the total expected infestation period. This will enable the technical committee to plan and stretch out total flight hours through most critical periods.
(B) Logistician for aerial support should be on the spot to organize materials, pesticides, aircraft fuel, local support team before the arrival of aircraft. (C) Aircraft crew must accept to live in and operate from villages remote from big cities. The contracting companies must ensure that crew's members have the facilities for good living and relaxation between operations. (D) Recipient governments must ensure the safety of aircraft and crew in country. (E) The pilots should, of course, respect the orders of the technical committee and the Ministry of Agriculture as regards treatment areas. Chad: J. E. Ohabvike
 - Time management was weak; the aircraft should have been delivered earlier. The team seemed to be somewhat careless in handling pesticide. Protective clothing should have been worn at all times. Chad: V. Diefenthaler
 - Control by experienced aircraft personnel. Ethiopia: USAID
 - For locust spraying the following aircraft specifications were suggested: Micronair equipped, high wing for good visibility, capacity to carry observer, long endurance (4-5 hours), 200-300 liters insecticide carrying capacity, VHF, or preferably HF to talk to ground units. Several people said that either an engineer should accompany the aircraft or be on call at predetermined locations, and that crews should be willing to land and, if necessary, overnight in a hardship area. (And aircraft should be such that it can land in difficult places). Sudan: GH/L Program
 - Ask USDA-FS/APHIS experts who participated in 1986 and/or 1987 to review and comment. While we have ideas we think this subject is best left to experienced experts who work in this area regularly. Guinea-Bissau: J. A. Franklin
 - Wire contracting officers who are familiar with performance standards for agricultural aviation and operating under African conditions. Safety and effectiveness should be given greater consideration than cost cutting when operating in difficult conditions (sometimes life-threatening). Mali: USAID/Bamako Technicians

- The contractors have been satisfactory thus far. Mali: S. Sountera
- No real changes in the aircraft contracts appear to be necessary, from experience in Burkina and Niger, with the exception of stricter penalty clauses. AID just needs to be more hardnosed about getting contractors to do the job for which they were hired. Burkina Faso, Niger: C. Kelly
- Efficiency of contractors good. Safety good if OCLALAV used. Contracts need to be based on potential crop areas to treat and logistical capabilities of country, i.e., airstrips/ground support. The Gambia: A. McKenzie
- The political aspects of large plane operations could be greatly reduced by funding through FAO or a multilateral effort. Electronic guidance for any aircraft should be the responsibility of the contractor. APHIS contracts should be followed and APHIS assistance requested in preparing contracts. Forest Service specialists should review contracts prior to award. Use of large aircraft would allow planes to remain on standby in U.S. until needed. Senegal: E. Huddleston
- I have not had access to past aircraft contracts, but would feel that a review by knowledgeable experts could effect changes to improve efficiency, costs, and safety. There is now the advantage of analyzing how 1986-87 contracts are performed and observation of problem areas. Niger, The Gambia: C. M. Voss
- I strongly recommend a "sit-down" review of the AID contracts with: AID contracting officers, USDA Forest Service and APHIS contracting officers and contracting officer representatives, and AID field personnel (direct hire and TDY). Following this review, leading to a "concensus" boilerplate contract, input should be solicited from aerial applicators, etc. Then, this basic contract could be pulled off the shelf, the blanks filled in, and sent out as an IFB when the emergency arises. Senegal, Mali, Burkina Faso: R. G. Adams
- AID should develop a standard aerial contract similar to the APHIS contract. The contract should include specifications for aircraft and dispersal equipment required, and for pilot qualifications. This type of contract has provisions for requiring special safety related or other equipment. It also has provisions for liquidated damages for non-performance.
AID should develop its own bidders list. This can be accomplished by drafting a letter explaining the program and what is required of a contractor, accompanied by a questionnaire to obtain information on type of equipment, performance, availability, etc. The package should be sent to contractors on the APHIS bidders list to determine interested parties. J. A. Henderson
- Whew!! Have good contracting officer write them--not the contractor. F. M. Philips: J. A. Henderson

- Should be answered by aerial specialists. Chad: P. W. Orr
- I have not seen the aircraft contracts that were used in the campaign. USDA/APHIS-PPQ has developed a contract that has been revised as needed over a number of years of grasshopper control programs. It seems a needless duplication of efforts for USG not to avail itself of the wisdom APHIS has gained in the process. A prospectus for 1986 contracts is included in my trip report dated April 20, 1987. This may serve as a basis for aircraft contracts in Africa. For further information, APHIS may be contacted at: Attn: Contracting Section; USDA, APHIS, Field Servicing Office; Butler Square West; 100 North 6th Street; Minneapolis, MN 55403; Telephone: (612) 349-3111. Senegal: K. Seethaler
- Suggest consulting Forest Service air operations specialists that were assigned to USAID. Mali: L. Yarger
- AID should make greater use of APHIS and Forest Service performance standards as they have been developed over long years of experience dealing with commercial aerial applicators. Senegal: G. E. Cavin
- Not to improvise the services procurement: contracts need to be negotiated long before the crisis period; exhaust the existing local contracts before searching for outside contracts; procure treatment airplane services for a whole sub-region. Chad: Ngaromillet Michel

5. Should U.S. aerial operation specialists be given the Contracting Officer Representative's responsibility to administer aircraft contracts?
- Not relevant to Cameroon, as Mission did not contract for aerial spraying. Cameroon: J. Dorman and M. Lang
 - Yes. Cameroon: S. Njymian
 - Administration of the aircraft contract should always rest with USAID direct hire project officer. Contractors are often not familiar with AID policy or regulations, nor do they fully appreciate the objectives of an emergency program and the urgent need to act quickly. In the case for Chad, the aerial treatment specialist was clearly not suitable to direct an emergency operation without close supervision from the USAID direct hire project manager. Proper implementation would have been seriously jeopardized had the ATS been given responsibility of administering the contract. He did not grasp the urgency of the operation and on two occasions deliberately delayed the operation from starting for minor and insignificant reasons. On the day the spray aircraft were ready to depart to their sites of operation in eastern Chad, the ATS resigned for personal reasons and left his tasks to be implemented by the USAID entomologist. These actions by the ATS would have led to a breakdown in communication and would have been the start of a never ending conflict between USAID and the aerial treatment contractor had the contract administrator not been the USAID project officer. Chad: USAID
 - Not actually necessary given the presence of the logistician, program officer and the technical committee. Supervision of the contract should be left with the program officer. Chad: J. E. Ohabvike
 - USAID should administer the contract but technicians should manage the operations. Chad: V. Diefenthaler
 - No outside contracting took place in the Sudan. All aircraft were contracted by and paid for by the GOS in 1987. One person felt this was a good idea, provided contracts were discussed with usage specialists. Another Sudanese respondent said he agreed but that some GOS people might see it as a trespass on GOS authority. Sudan: GH/L Program
 - Yes. Should be delegated to a qualified full-time U.S. Government employee experienced in this area - for U.S. Government contracts. Should also have national counterpart and observational plane available. Guinea-Bissau: J. A. Franklin
 - Absolutely yes. Again, highly qualified individual is a must. Mali: USAID/Bamako Technicians
 - One can continue in the same manner as before. Mali: S. Sounera

- Either the contracting officer should have complete knowledge of all aspects of aerial contracting, or a specialist should be brought in, or contacted for the contracting. Mauritania: W. B. Thomas
- No, the aircraft company's field representative will probably not have authority to negotiate changes in a contract. For a large contract where company principals are based overseas, delegated authority maybe appropriate through the Mission Director/Contract Officer.
The aerial operations specialist is concerned with day-to-day operations. These activities should not require major changes in the contract. If they do, there are major problems with the contract and the contracting officer needs to be involved. Burkina Faso, Niger: C. Kelly
- Yes. Putting it in hands of GOTG did not work this year. The Gambia: A. Laurence
- No. Niger: F. Boillargeon
- No. Senegal: A. B. Ndiaye
- Yes, to prevent excessive duration of hours that cannot possibly be used based on a country's logistical capabilities. The Gambia: A. McKenzie
- Yes. Senegal: E. Huddleston
- Yes, for U.S. contacts, if properly trained specialists are available. This should include a visit to a contractor's base facility in the U.S. in advance to review capability of equipment and personnel. Niger, The Gambia: C. M. Voss
- Yes. However, they must be regular U.S. employees, either of AID or TDY from other Federal agencies. I do not believe that contract personnel can serve in the name of the USG. Note: this is a formal delegation from the Contracting Office (CO) to the Contracting Officer Representative (COR) and, usually, to an Inspector--who is on the site. Each has specific authorities which can/cannot be delegated, etc. Senegal, Mali, Burkina Faso: R. G. Adams
- At first sight, yes. Sudan, Mali: G. A. Schsefers
- The contracting officer's representative should be a ranking member of the AID Mission. He should provide the aerial operations specialist, or another party who is always present at the base of operations, with a copy of the contract and a letter authorizing this party to represent him in dealing with the contractor or the contractor's representative. J. A. Henderson
- Yes. F. M. Philips: J. A. Henderson
- Absolutely, with sufficient lead time to study the entire contract and make preparations to meet to exigencies of an African campaign.

This point cannot be overemphasized. Misapplication and runaway costs are inevitable if aircraft operations are not strictly disciplined. They must be closely controlled by a Contracting Officer Representative who understands the contract and is not afraid to enforce it. Senegal: K. Seethaler

--- If not used they should provide training to those persons designated.
Senegal: G. E. Cavin

--- Suggest consulting Forest Service air operations specialists that were assigned to USAID. Mali: L. Yarger

--- Not necessarily. It can be the role of a non-American member of the Office of Disasters. Chad: Ngaromillet Michel

6. For future control assessments, should more emphasis be placed on multi-national assessment teams?
- Yes, if that will not cause delays. Cameroon: J. Dorman and M. Lang
 - Yes. Cameroon: L. Soumare and A. Giner
 - Yes, and should include a representative of host country. Cameroon: S. Njymian
 - Multinational teams which travel across the Sahel assessing infestations are limited by the time they are allowed in each country. There is a need for effective surveys, and this can be done successfully by multinational teams if they are allowed several weeks in each country and are provided adequate support to do more complete field work. Such support should include in-country air transport and field vehicles. In 1986, a multinational team was able to thoroughly survey the Lake Chad area in half a day on a helicopter. Chad: USAID
 - This is very necessary with major donors being represented at least to directly witness how effectively their governments' assistance was used. Chad: J. E. Ohabvike
 - No. Too many conflicting stories develop. Multinational teams are often inflexible even when proven wrong. Chad: V. Diefenthaler
 - One failed to answer, one answered but didn't address the question and four answered yes. The two expatriate consultants said the job should be given to someone who knows what they are doing and knows Africa. The FAO consultant felt that most Americans would therefore be excluded. Sudan: GH/L Program
 - Yes. Incountry multinational teams with external assistance when needed or to help standardize results. Guinea-Bissau: J. A. Franklin
 - Yes, only if the multinational team covers all of the zone countries within the emergency and if results can be commonly shared and approved by the multidonor community. We recommend that the U.S. initiate invitational, multinational assessments with bilateral donors, i.e., PRIFAS, TDRI, DUTCH, GTZ. Mali: USAID/Bamako Technicians
 - Yes. Mali: S. Sountera
 - Yes, the more coordination the better. Mauritania: W. B. Thomas
 - Yes. Burkina Faso, Niger: C. Kelly
 - The Gambia had multinational group of TA's. The Gambia: A. Laurence
 - No, national only. Niger: CIDA: F. Boillargeon
 - Yes. Senegal: A. B. Ndiaye

- I feel that these teams provide objective and adequate reports.
Niger: M. Germaux
- This worked well in the Gambia this year. The Gambia: A. McKenzie
- Yes. Senegal: E. Huddleston
- Only if the emergency projects were going to be managed by a multinational team. Senegal, Mali, Burkina Faso: R. G. Adams
- Sounds cumbersome. Sudan, Mali: G. A. Schaefers
- Ok. F. M. Philips: J. A. Henderson
- Project objectives must be clearly defined for multinational assessments to be effective, since the various experts come from different backgrounds and have differing control experience. Ideally, all assessment teams should be directed by experts who have had large-scale aerial and ground insecticide application experience.
Chad: P. W. Orr
- This may create more heat than light. Special interests of the various international entities may distort objective assessments. But, having said this, it must be recognized that long-term solutions to international problems require international cooperation. The concept of multinational assessment teams should be encouraged.
Senegal: K. Seethaler
- The multinational teams appear to be well received by all donor agencies. There was a degree of acceptance of a team identified as an FAO team that might not be given to a U.S. "only" team. I do not think that more emphasis should be placed on a multinational team but I do think more time should be allocated for the team's visit to a specific country. Chad, Niger: J. J. Drea
- Yes, working together may resolve some of the disputes that have surfaced in the past. Senegal: G. E. Cavin
- Yes, multinational including host country representatives. Otherwise, everyone will pat themselves on the back while others are stabbing them. Senegal, Mauritania, The Gambia: B. Overholt
- Yes. Diversity expertise and responsibilities, and strive for multinational efforts. Mali: L. Yarger
- Yes. Focus more on the multinational and multidisciplinary teams.
Chad: Ngaromillet Michel

7. Should FAO be better utilized as a means of focusing donor efforts?
- FAO had complete control of donor coordination in Cameroon.
Cameroon: J. Dorman and M. Lang
 - Yes. Cameroon: L. Soumare and A. Giner
 - Yes, but there exist too much bureaucracy and discriminatory tendencies causing delays. Cameroon: S. Njymian
 - USAID/Chad supports GOC's position that programs are more efficient and effective if done bilaterally. The host government has the responsibility of coordinating donor efforts. Chad: USAID
 - Certainly, yes. This makes for a better functioning. Governments feel they have more liberty to attack FAO which they consider belongs to the and seek redress which they often got but would keep silent even when they are dissatisfied with the handling of operations by representatives of donor governments as they do not want to provoke political incidents. Chad: J. E. Ohabvike
 - No. Government of Chad should play this role. Donors should work together to develop Chad's capacity to better control efforts.
Chad: V. Diefenthaler
 - Yes, FAO was extremely effective in the 1987 Ethiopian program. Only if FAO is capable of responding adequately. The respondent noted that in Ethiopia, FAO responded well; however, this is not the norm.
Ethiopia: USAID/Addis Ababa
 - Six gave affirmative answers without explanation. The other three also responded affirmatively saying that this is FAO's role: they can attract consultants that could not be provided by other agencies. One said the strengthening of FAO's Headquarters in respect of locust campaigns is required and another elaborated on this suggesting that then the idea of a pesticide "bank" could be worked out properly. Sudan: GH/L Program
 - Country team is probably better focal point on a country-by-country basis with results reported (to FAO and donors in country) for relay to their respective organizations. Issues involving a group of countries with similar problems, or a country unable to generate sufficient support from donors; or resolution of other issues (i.e., standardization in a neutral format can be focused at FAO).
Guinea-Bissau: J. A. Franklin
 - No, unless there are major improvements in FAO management and organization. Mali: USAID/Bamako Technicians
 - Yes. Mali: S. Sountera
 - Not necessarily. Rather than leaving FAO to decide what, where, and when donations should be given, a multilateral coordination committee is a better way of handling the situation. Such a team effort can go

beyond mere focusing of donor efforts, and can work with the host country in directing crop protection operations as well as coordinating donations. Mauritania: W. B. Thomas

- FAO should be utilized to coordinate and provide specific technical assistance, but its overall role should not be expanded. Burkina Faso, Niger: C. Kelly
- What efforts? It is doubtful (that FAO can be better used). Niger: F. Boillargeon
- Yes. Senegal: A. B. Ndiaye
- The role of FAO appears effective, as coordinator and as "centralizing point" of certain aid. Niger: M. Germaux
- Donor efforts do need centralizing and FAO would be well placed. The Gambia: A. McKenzie
- Either FAO or a multidonor funded team is definitely needed. Senegal: E. Huddleston
- Only if FAO can get its political and/or administrative house(s) in order! Senegal, Mali, Burkina Faso: R. G. Adams
- I understand there is room for improvement in this area. Sudan, Mali: G. A. Schaefer
- They have never been effective in this aspect. F. M. Philips: J. A. Henderson
- FAO coordination of donor efforts was a monumental task for the 1986-87 campaign. Communications with FAO, Rome, and the project area could be improved and decisions could seemingly be made more rapidly. Hopefully, some steps can be taken to reduce bureaucracy in future emergency pest control projects. Chad: P. W. Orr
- It is my understanding that FAO doesn't contribute much in the way of resources but wants to take a leading role in coordinating donor efforts. It is hard for someone at my level to discuss the political ramifications of this. Senegal: K. Seethaler
- The use of FAO to better focus donor efforts. The local FAO office in the country should have more autonomy for disbursement of a given set of funds. This would be specially important in meeting crisis situations that would not allow for the normal chain of authorization via Rome and the donors. Also greater focus on FAO may help strengthen the use of standardized equipment for a given country. Clearance could be obtained from FAO and the specifications could be drawn up by FAO. These would reflect the need for a particular country and a list of needs made available to the donor organizations. Chad, Niger: J. J. Drea

- Yes, I believe so. They seem to have the respect of the host countries, and that is essential. The UN is everybody's organization, and this removes part of the donor-recipient mentality which clouds many development efforts, especially those of the emergency type. Mali: L. Yarger
- FAO's role, i.e., the organization of donors and host countries, is of prime importance. In emergencies, for example, donors are immediately referred to a country, and the FAO, which to some extent could be considered a donor, also gets involved.
- Donor countries have always made themselves available, whether it be through direct means or through FAO channels. Mauritania: Tahara Galledou
- The bilateral aid appears to be quick and well coordinated especially if there is a representation in the host country. The bilateral aid is flexible and can be adjusted to various situations during the implementation stage. FAO can be OK too. Chad: Ngaromillet Michel

8. How can Mission briefings be improved for contractors and TDY detailers so that these people are better prepared to carry out assignments?
- USAID should interview all TA candidates prior to contracting. Chad: USAID
 - I suppose that present level is quite sufficient but you could also have a look at FAO Model. Chad: J. E. Ohabvike
 - Hire people with appropriate experience. Chad: V. Diefenthaler
 - Attach to national and regional organizations and operate under their guidance and supervision. Ethiopia: USAID/Addis Ababa
 - There was no response from eight of those questioned. One Sudanese respondent said consultants should be briefed on the "social structure" of a country and the "hardships" there. Comment: he may have been hinting that sensitive, diplomatic people should be chosen. Impatient people are not very effective here no matter how technically competent they may be. All consultants in 1987 were briefed by team leader as they were all FAO contracted. Exception was CICP L. Pinto who relied heavily on Mission Administrative support during his TDY's. Sudan: GH/K Program
 - Ask the 1986-87 contractors and TDY detailers how. Guinea-Bissau: J. A. Franklin
 - Early organization of the Mission emergency program and the support apparatus is the key to successful emergency articulation of plans and policies to contractors; a clear expression of their scopes of work and the results anticipated in a desired timeframe; frequent update meetings to review progress and subsequent planning. Mission briefings must also address non-technical matters, e.g., relevant host country attitudes and cross cultural relations. Mali: USAID/Bamako Technicians
 - The majority of assigned contractors and civil servants do not have experience working in Africa. Briefing is good, but experience is even better. Mali: S. Sountera
 - More specific technical information would be helpful, but more importantly would be a briefing on AID paperwork. This should be mandatory, as even the smallest item of work or exchange in the AID system requires what seems at first to be cryptic paperwork. Much wasted time could be gained with an intro to the ways of AID paperwork. Mauritania: W. B. Thomas
 - Detailed briefing of contractors and TDY personnel should take place once the contractor arrives at post. Briefing in AID/W should focus on the particular work to be accomplished under the contract and access should be provided to all relevant background information. My experience has been that only in the case of gross incompetence is the field willing to refuse a contractor or TDYer. Normally so much

effort has gone into getting a person to the field that the pressure of getting something going overrides longer term considerations as to overall qualifications, adaptability or cultural sensitivity. As a result, great care should be taken in choosing personnel for overseas assignments. Briefings in AID/n or the field cannot make contractors or TDYers competent or capable of accomplishing the tasks for which they were hired. Burkina Faso, Niger: C. Kelly

- Training. Niger: F. Boillargeon
- These briefings seem to be adequate. It is up to the various donors to improve briefings if they judge it necessary. Niger: M. Germaux
- Briefings were good. The Gambia: A. McKenzie
- The procedures used by AID/Dakar worked reasonably well. Senegal: E. Huddleston
- Mission briefings along with a supply of as much detailed pertinent information as possible should be provided well in advance of assignment. Mission personnel should have a meeting prior to the trip to review the Mission. On my first trip, I had a very good briefing at OFDA the morning before boarding the plane and given the "black book" with much literature to read on the way over along with meeting most of the Mission personnel (except Bob Thibeault) for the first time in Africa. Niger, The Gambia: C. M. Voss
- Bring current/involved Mission personnel to AID Washington for the "startup" briefings. This person could then be assigned by the Mission Director to be the assessment team liaison. Senegal, Mali, Burkina Faso: R. G. Adams
- Mission personnel are clearly better based on the political sensitivities involved with the assignments. Early briefing on these sensitivities will eliminate many deadends for the contractors or TDY detailers. Sudan, Mali: G. A. Schaefers
- Provide details on the type of information desired. F. M. Philips: J. A. Henderson
- The briefings in Washington and in Chad were well done. They prepared the team for the task. Chad: P. W. Orr
- Contractors and TDY detailers are inundated with cable messages, reports and other literature. It takes time to digest this and to learn to select the most significant. A brief, well written synopsis in advance of the briefing would do wonders to start personnel with an orientation to the situation and help them to better understand the goals. Senegal: K. Seethaler
- Mission and USAID/OFDA briefings were adequate. TDY detailers need to know up front that assignments may vary from original plans based on changes in activities in the host country. This should be expected by all TDY detailers. Mali: L. Yarger

- Mission briefings for assignments can be improved as follows:
- a. More details at Washington defining in as much detail as possible just what is expected of the TDY individual.
 - b. The list of items to be covered during assignment should be made available at the earliest possible date to permit individual to prepare for assignment and do necessary "homework."
 - c. The time of each in-country visit should be long enough to permit 1-2 days being devoted to writing the report before leaving the country.
 - d. Although the presentations by experienced personnel from the countries were excellent there was not enough time for a one-on-one discussion to familiarize oneself with the project in that country and the people to be contacted. Pulling this information out of telegrams and reports may be adequate but it is not ideal.
- Chad, Niger: J. J. Drea

VII. COMMUNICATIONS

1. How best can USG assist host countries in the development of a communication plan that deals with the acquisition, maintenance, and appropriate use of equipment?
 - A TDY Team is needed to assess the needs and assist in actual establishment of a radio network. The solar-powered battery system looks good. Intermediate range and mobile radio needs should be an integral part of a radio network. Senegal: E. Huddleston
 - Communications were a serious shortcoming, but improvement is beyond my abilities. Sudan, Mali: G.A. Schaefers
 - Communications within Chad were non-existent. USG or FAO should stockpile and maintain radio facilities that can be deployed needed to provide communications on emergency spray projects. USG should work with the host governments to obtain required permission for such a radio system before the project begins. Chad: P. W. Orr
 - This is a logistical function. The logistician should coordinate with a host country counterpart. Good communication systems are in operation in the U.S.. It is not necessary to start from scratch. Once a communication system is mapped out, procurement, distribution and installation should follow in a rational way. Senegal: K. Seethaler
 - USG assistance to develop a communication plan for equipment. Chad, Niger: J. J. Drea
 - USAID should acquire via contract or TDY detailers, the assistance of a communication specialist who can develop a communications plan for host countries based on what is practical for use in the host country. Suggest this be investigated soon so that a plan can be in place prior to the next need for TDY detailers or contractors. Mali: L. Yarger
 - This is a very important problem. I have heard communication experts suggest good plans. Mali: S. Tunnock
 - I don't want to keep repeating myself, and I'm sure you think I'm missing the point, but the best way we can assist countries is through long-term development (as opposed to fire-fighting) projects. These need not be terribly expensive. One effective crop protection specialist in each country with a moderate budget (ca. 3000,000/year) would go along way in resolving many of the issues raised in this questionnaire. Senegal, Mauritania, The Gambia: B. Overholt
 - Acquisition, installation and training use and maintenance. Cameroon: S. Njymian
 - Specialized training program for host government decision makers and high level technical officers can prepare staff to do appropriate

selection of equipment. Follow procurement; and prepare for maintenance of equipment. Chad: USAID

- A country like Chad is vast and poorly served by radio linkage. For plant protection service at least 20 vehicle mounted radios are needed with a few fixed radios for areas..... Training of radio operators and a radio mechanic is thus essential. Chad: J. E. Ohabvike
 - Develop a stronger plant protection office to better administer their work. Training is important to expand their knowledge of different modes of operation. Chad: V. Diefenthaler
 - By studying the problem with individual host governments, through communication with responsible departments and donor groups. Ethiopia: USAID/Addis Ababa
 - A brief study of existing facilities should be carried out, one respondent said, and then a program devised for acquisition, maintenance and training in appropriate use of equipment. Others felt USG should:
 - A. provide PPC with radio sets for all stations and sub-stations.
 - B. Establish a sophisticated radio workshop and a mobile workshop to improve maintenance facilities.
 - C. Provide survey and control vehicles with radios.
 - D. Provide radio spare parts.
 - E. Ensure the early purchasing of insecticides and spray equipment to arrive in the country before the rainy season.
 - F. Provide PPD with trucks for transportation and light vehicles for communication.
- One Sudanese respondent thought that provincial PPD staff, although highly qualified professionals, are not consulted enough.
Sudan: H/L Program
- Encourage standardization of vehicles and application equipment within a given country to reduce logistics, training equipment requirements and parts inventory. See IV 1 small engine repair, etc. Consider CPS/MOROCCO (AGADIR) as possible training site for some of above. We don't know what you mean by a "Communication Plan." Guinea-Bissau: J. A. Franklin
 - We view communications as an integral component of the overall operations plan. A functional radio network is the sine qua non of a successful field campaign. The U.S. should support training for all radio users. The U.S. should establish written guidelines for radios to be used in training, selection of equipment, spare parts, and installation. Mali: USAID/Bamako technicians
 - Radios are the only way of communicating with areas outside of Noukchott, and thus are essential to the functioning of the Crop Protection Service. The fifteen radios donated by the USAID during this campaign added significantly to the communicative ability of the CPS. Future aid should include more radios, antennas, and

maintenance for existing equipment. There is also work to be done on the organization of the radio system. Mauritania: W. B. Thomas

- Developing an efficient communications system (equipment, procedures, and data collection) is a long term development activity which should be pursued by the Donors. Where there are bilateral projects, AID should continue to provide assistance in improving basic information flows and training in emergency operations. Where no bilateral program exists, it may not be AID's role to work with the Crop Protection Service, except in an emergency situation. When assistance is possible, short and medium term attention should be focused on operating procedures and improved data collection methods in the field. Long term objectives should include more effective communications systems through additional equipment and operating procedures and reporting systems attuned to specific pest problems and local conditions. Burkina Faso, Niger: C. Kelly
- Everything in this area should be redone, from A to Z. Niger: M. Germaux
- Contract with U.S. agencies, i.e. USDA-FS, USDI-BLM, for communications expertise on short-term assignments to the requesting mission/nation. Senegal, Mali, Burkina Faso: R. G. Adams
- Communications were a serious shortcoming, but improvement is beyond my abilities. Sudan, Mali: G.A. Schaefers
- Because equipment originates in various places, only training can help resolve problems. Mauritania: Tahara Galledou
- Procurement of portable and fixed radio equipment to cover the host country. The network may be linked to a communication satellite.
- Provide technical assistance to train local technicians in maintenance and utilization of equipment. Chad: Ngaromillet Michel

2. Were communications between AID/W, FAO Rome, USAID Missions, FAO field, DLCO/EA and the regional control organizations acceptable? How could they be improved?
- Communications were acceptable, if sometimes ponderous, except for USAID with FAO/Rome. A direct channel should be established. Cameroon: J. Dorman and M. Lang
 - Never acceptable. Cut down on bureaucracy in both Rome and Washington. Cameroon: S. Njymian
 - Communications between USAID/Chad and other donors was excellent. Communication among other donors seemed weak. There seemed to be a lack of interest in learning what the other guy was doing. The GOC Donor Coordination Committee should have met more frequently. Chad: USAID
 - Yes. This could, however, be further improved by rapid transmissions of information by program officers in-country. Chad: J. E. Ohabvike
 - Four people failed to answer the question. Three responded affirmatively but didn't elaborate. Symmons said communications were O.K. here but not very good elsewhere. He said there is a need for medium-term project heads to visit Rome from time to time. From Mission perspective communications between AID/W and Mission were good. FAO/Sudan at times asked AID Mission to transmit message to FAO/Rome via FODAG. In general FAO/Rome was very responsive to FAO teams' requests for clearance on action. FAO/Rome slow on procurement. , although a member of the steering committee, often did not attend. Operations Chief made special efforts with FAO and donors whenever they were in town. Sudan: GH/L Program
 - Replace the American field technician in Guinea-Bissau next year with one willing to prepare reports. Guinea-Bissau: J. A. Franklin
 - We cannot adequately address the full intent of this question since we did not communicate with all parties. However, field level communications were good during the 1987 campaign. We suggest that field reporting traffic be made available to all interested parties. Mali: USAID/Bamako technicians
 - No. It can be improved by harmonizing methods of approach and by systematizing the circulation of information. Mali: S. Sountera
 - More and better communications would help coordination of aid organizations' efforts. Although they now could just be considered acceptable, there could be much improvement. Improving such communications would entail an increased level of participation by both the donor community, and the regional and governmental control organizations. As it stands now, the host country stands to benefit most materially by a disorganized donor community. Mauritania: W. B. Thomas

- Communications from and to the field within AID were excellent at the beginning of 1987, but deteriorated during the season. In the case of Niger, by September little information was being received from AID/W in response to specific inquiries or on the overall locust and grasshopper situation.

- FAO reporting, either directly or through AID, was poor. Their transmission system is slow. This problem is aggravated by an apparent inability of Rome to keep their field offices up to date on what is going on with donors, in Rome or in the field.

- Direct contacts with PRIFAS in Niamey were good, but the PRIFAS report, mailed from France, was often too late in arriving in the field. With PRIFAS and several other donors, the best information came from periodic visits by technicians whizzing across the Sahel.

- Improving other donor's systems may not be an area in which we should be involved. Backing FAO transmissions (as is often done) reinforces this source of information and improves information availability in the field. Burkina Faso, Niger: C. Kelly

- What about other international organizations. Communications can be improved through an Early Warning System. Niger: F. Boillargeon

- Yes. Senegal: A. B. Ndiaye

- These communications seemed adequate during the 1987 campaign basically as a result of good inter-personnel relations. Niger: M. Germaux

- The system was adequate since the Operations Center provided daily contact with FAO and OCLALAV. Communications with PRIFAS were limited to the newsletters. Improved communications are needed. Senegal: E. Huddleston

- No. Channels were unclear and cluttered. In the "off season" AID and other Mission Directors should sit down with the agencies to develop and implement communication plans--and then "stick to the channels" in order for them to work. Senegal, Mali, Burkina Faso: R. G. Adams

- Communications with OFDA, FAO field, and AID missions were adequate. Chad: P. W. Orr

- Any delays in communications seemed to be between the home office (e.g. AID/W, FAO/Rome) and the appropriate field office. The delays were not so much in actual contact but in getting appropriate authorization to react in a very short time. Communications between agencies within countries appeared to be adequate and effective. Possibly a greater degree of autonomy up to a financial limit (contingency funds) would be appropriate. This appeared to be a problem with FAO. This would reduce the need for urgent communications that were, at times, delayed. Chad, Niger: J. J. Drea

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--- In Mali, we had a very difficult time getting radio contact from field to AID office. Mali: S. Tunnock

--- I would assume that communication in 87 was better than in 86. All parties concerned should agree on who will coordinate communication, and how it should be accomplished. FAO could possibly fill this role. Senegal, Mauritania, The Gambia: B. Overholt

--- This is a question to which each institution must respond. Nonetheless, they are all members of national coordinating committees. As such, information is received at the same time, with the exception of special cases in which one institution wants compiled, detailed, and/or specific information. Mauritania: Tahara Galledou

--- Communications have improved between AID/W, FAO/Rome, FAO in most countries and PRIFAS. We wish to increase the level of cooperation between existing organizations and mixed teams. Chad: Ngaromillet Michel

VIII. AVIATION/AERIAL SPRAYING

1. What standards or guidelines should be applied to determine the appropriate type of aircraft for use in a particular situation, considering such factors as size of treatment area, remoteness, and cost comparisons?

--- Along with the above listed factors, logistical considerations have high priority in Mauritania. Because it is so difficult to get fuel, pesticide, and support personnel out to the small airfield in the bush, the appropriate aircraft are those that can ferry from more assessable airports to the treatment areas. In theory, it would also be logistically simpler to preposition fuel and pesticides at these larger airports in order to facilitate rapid treatment deployment.
Mauritania: W. B. Thomas

--- The factors outlined in the question are the factors which should be considered in a decision on the use of aircraft. More importantly, it will be necessary to decide what is an acceptable level of crop loss (economic and social thresholds for intervention) and the amount of funding which will be made available for aerial operations. If funding is only available for three small planes to treat 600,000 Ha in two weeks, strategies for maximizing the impact of the aircraft (e.g. drift spraying) need to be available .

Another factor to be taken into account is the precision and capacity of the parties doing the ground survey and spray plot identification. If adequate resources are not available for these activities, then less precise options for aerial applications will need to be followed regardless of the type of aircraft used. In this case (typical of the Sahel), aircraft able to cover a large area (general application) per flight may be more effective than small aircraft, which are more adapted to precision spraying. Burkina Faso, Niger: C. Kelly

--- I believe for surface areas ranging between 10,000 - 100,000 ha., a Cessna 185 or 188 type aircraft should be used. Beyond 500,000 ha., a DC 7 type heavy carrier may be used. In Niger the use of this type of aircraft is not required. The use of this type of an aircraft for large areas is not necessary if air strips are constructed near the zones to be treated. In this case, the Cessna 185-188 can still continue to carry out spraying efforts of large areas. In 1987, these aircraft treated areas located between 100 and 150 kms. away from the nearest airstrip (Dakoro, Mayahi sector). Niger: M. Germaux

--- Large aircraft (category A) are most useful when large spray blocks are involved. A single plane can ferry large quantities of insecticides long distances and cover large areas (5,000 to 10,000 ha. per day). A disadvantage inherent with them is that if one large aircraft fails to fly for any reason on a given day, a large area will not be treated on that day. These planes are most useful for spraying very flat areas, fully loaded, they cannot maneuver in rugged terrain. In remote areas where there are few roads, they have an advantage over small aircraft because they don't require the

services of ground support vehicles to provide fuel and pesticide. They do require good air to ground coordination, however.

Small aircraft are capable of spraying 1000 to 1500 ha per day. Four aircraft the size of a Turbine Thrush (category C) can be expected to cover as much area a large plane in a given day. They are more maneuverable than large aircraft and have a big advantage in turn time (the time it takes to bank and reverse directions which can be longer than the actual spray time). They are limited by the ferry distance from landing strip to spray block. Fully loaded, the planes have a limited range. If they must ferry more than 25 to 30 miles to reach the spray blocks, they begin to lose their turn time advantage. They can operate well from remote landing strips that must be provided with fuel and pesticide by support vehicles. Where the roads are good, small planes can hop from site to site followed by their support vehicles.

Helicopters have even greater flexibility than small aircraft and don't require landing strips, but they are expensive to operate on a per hectare basis. They are most useful in covering small patches of land.

Probably the least useful information is simple operational cost comparisons. Where effective control is the objective, the cost of application per hectare says little about the more important considerations of grasshopper kill counts, correct application of appropriate pesticides, and minimizing environmental damage. The best approach, where feasible, is to make a program by program evaluation that includes the actual mortality of target and non-target species. Only in this context can reliable cost comparisons be made.

Once again it seems in order to consult with APHIS. Their experience with this has been quite extensive. Specific reference is again made to the APHIS Prospectus described in Question VI-4 above. In the prospectus, aircraft are charted according to category (A, large to E, very small) and swath spacing.

In addition to APHIS, there are resources at the state level for establishing application specifications for aircraft. An excellent reference source has been published by the Colorado Department of Agriculture called "Agricultural Pest Control Series." Specific publications of interest in the series include:

General	Stock No. 393-80-01-0015
Rangeland Pest Control	" 393-80-03-3017
Insects	" 393-80-03-1011

They may be acquired at
Division of Central Services
1001 East 62nd Avenue
Denver, CO 80216
Tel: (303) 287-8057
Senegal: K. Seethaler

- Use the standards and guidelines recommended by the manufacture of the pesticide being used. Also, many federal and state agencies are involved in aerial and ground pesticide applications. These agencies can provide information on equipment types and application techniques. Mauritania: C. E. Cavin

- As an ecologist of sorts, I have a hard time accepting the usefulness of blanket spraying. Timely and credible survey efforts, coupled with effective ground control operations will, in most cases, circumvent the need for large scale aerial spraying operations, when deemed necessary, should be targeted to areas of infestation in close proximity to croplands. When things really get out of hand, as they did in 86, large scale spraying may be the last resort. This should be avoided if at all possible. Senegal, Mauritania, The Gambia: W. Overholt

- Based on 1986 and 1987 experience and the APHIS/NMSU DC-7 trials, large aircraft, especially the DC 7C with electronic guidance, is the aircraft of choice for any situation that has areas large enough to justify aerial intervention. The DC 7C is less expensive, more versatile, faster and at least as accurate as small planes. Senegal: E. Huddleston

- There should be proper standards applied to determine appropriate types of aircraft for various situations. Obviously, the larger treatment area or the further from the airstrips may require larger, long range aircraft. This subject needs to be reviewed by the various aircraft specialist who have worked for USAID and covered in more detail that can be presented here. I may cover some of this in the assessment report on which I am presently working. Niger. The Gambia: C. Voss

- The political implications of "large versus small" aircraft must be put aside! Once the decision to treat an area is made, and aerial application is selected, then the aircraft to do the job may be selected, NOT BEFORE! "Experts" with field/operational experience must be utilized and trusted for their judgement. Once the operation has started, it is too late for academia to conduct research or materially alter the game plan. The Gambia: A. Laurence

- The type and number of aircraft required for a job is determined by the size of the treatment area, ferry distances involved and the time frame in which the job is to be accomplished. Senegal: A. B. Ndiaye

- Judging by the problem in Chad with the Cameroon based company, I suspect that dependability and availability would be the first criteria to be considered. Chad, Niger: J. J. Drea

- Large continuous infestations (50,000 hectares or more) particularly in remote areas are conducive to large aircraft use, especially where guidance systems are required or long ferry distances are involved. If being ferried from the US use of large aircraft is generally more economical. Care must be taken to guard against charges of overkill

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- if large variations in population densities are present. No generalized standards should be set. Infestations should be evaluated independently. No source
- Type of craft, pesticide formulation, skill of pilot, meteorological conditions. Cameroon: S. Njymian
 - It may not be worthwhile to establish standards for spray aircraft other than for small vs large planes. In an emergency, you take what is available at a reasonable price. Chad: USAID
 - Certainly, size of infested area, remoteness of area from a good landing strip and rapidity of operations are determinant factors. But the size and nature of landing strips should limit the use of heavier aircraft. Chad: J.E. Ohabvike
 - Guidelines that can be adopted already exist. Chad: V. Diefenthaler
 - Specialized information - available only through professional spray companies. Ethiopia: USAID/Addis Ababa
 - Close liaison between PPD and specialists in the field of Ag. aviation from the donors or FAO should be maintained. A group comprised of representatives from these agencies should accept joint responsibility for [control]. Sudan: GH/L Control
 - Mission considers this aspect to be addressed by the aerial applications specialist. Mission officers and CPS agents should provide a clear description of target areas and levels of anticipated infestation that will assist the specialist in his determination of the type of aircraft for use in that particular instance. Mali: USAID/Bamako technicians
 - For the choice of the type of equipment, the availability of the landing strips in terms of the size of the zone to be treated is important, in my opinion. Mali: S. Sountera
 - Aerial spraying is costly, and studies should be made before adopting this method. The factors listed here should be taken into consideration in order to avoid wasting funds and to make the operation more cost efficient. Certain considerations should, at times, be taken into consideration (survival). Mauritania: Tahara Galledou
 - The plane must be for great areas allowing its optimum utilization. The helicopter will be for difficult access zones (flooded, rocky or enclosed by lack of roads). Burkina Faso: Gana Diagne

2. What protocols should be adopted that call for the inspection of aircraft and equipment prior to the signing of contracts?
- The USFS and APHIS standards seem appropriate for US financed contracts. Under such contracts, US laws apply. Changing contract criteria will affect liability and performance standards established through legal precedence. Mauritania: W. B. Thomas
 - Same as for USDA contracts. The Gambia: A. McKenzie
 - APHIS or Forest Service policy and specialist should be used. Senegal: P E. Huddleston
 - Considering the relatively high cost of providing aircraft services to Africa, it should be obvious that ample provision for inspection of aircraft and equipment be done along with examinations of an operator's and his personnel's ability to carry out a contract properly overseas. In many cases, operators who have not worked in Africa may not be aware of the lack of facilities and the extreme harshness if the African environment on people and equipment. Just being able to survive can take its toll on a company's resources. Niger, The Gambia: C. M. Voss
 - "Protocols" already exist. They have been established and are in common use by USDA - APHIS and FS. These should suffice - with any unique requirements of the host country. Senegal, Mali, Burkina Faso: R. G. Adams
 - When a contractor has been selected, his aircraft should be inspected for contract compliance and his pilots for qualifications by an aerial operations specialist. J. A. Henderson
 - Inspection should be mandatory to determine whether aircraft and other equipment meet specifications in invitation to bid. If they don't, contractor's bid should be rejected. F. M. Philips
 - APHIS has already developed and implemented these kinds of protocols. Basically, they define the kind and capability of aircraft within the contract. If the aircraft do not meet contract specifications based on the recommendations of the Contracting Officer's Representative, either a waiver is granted or fines exacted. Waivers are seldom granted and fines are often extracted. Senegal: K. Seethaler
 - Pre-inspection of aircraft prior to contract award is necessary to assure that aircraft included in the bid are actually controlled by the bidder and are fully equipped as specified and in condition to withstand, without frequent breakdown, the rigors to which they are likely to be placed. Senegal: G. E. Gavin
 - An on-site inspection of contract aircraft should be performed prior to awarding of the contract. However, this would seem to be impractical considering the location of the projects and location of contract aircraft. Possibly follow up on references provided by the

bidder or inspection of aircraft by inspectors under contract with AID for inspection services may be alternatives. Mali: L. Yarger

- Aviation regs are strict; thus, one can expect that if a reputable experienced firm is selected for the job, there will be no need to establish protocols for inspection. Chad: USAID
- No protocols are necessary provided the aircraft company accept the terms of contract to do perfect work with acceptable spray gear and have required insurance policy. Chad: J.E. Ohabvike
- Aviation regulations are already in force. Independent inspections are not exceeded. Chad: V. Diefenthaler
- A few Sudanese respondents said all aircraft are inspected by the Civil Aviation Authority and issued a certificate of airworthiness before being allowed to fly. One of the expatriate consultants thought a competent aircraft engineer should perform an assessment of the state of maintenance and equipment. It should be noted that several of the aircraft contracted by the PPD for pest control were without radios, and were deemed less than ideal for locust control by the FAO experts as they had only one seat. The objection to CDA in practice is that no atomizer produces a well-defined droplet size. All produce a range - a spectrum of droplet sizes. The volume median diameter (VMD) divides the drop spectrum so that half the insecticide is in larger droplets (than the VMD) and half is smaller. The usual crop sprayer uses T Jets (Boom and Nozzles). Most of the droplets are minute and drift everywhere since you usually spray without wind. Most of the insecticide is in a few large droplets which are wasted. The micronair is much better but is still not as good as desired. (Spinning discs are better still but there is no aircraft atomizer using this principle). There is an added problem in that what is incorrectly called quote precision spraying unquote uses EC to get the volume to make enough droplets. In hot conditions the water evaporates but because surface area is proportional to the square of the radius and volume to the cube, water evaporates much faster from small droplets than from large. Which means the very small droplets become very small indeed almost instantaneously but the large droplets change only slowly, at least to begin with. That makes the drop spectrum even worse. "Drift spraying" is an unfortunate term because people think drift is uncontrolled. In fact the drift in "drift spraying" in a steady wind is under good control; it is the drift in "precision spraying" which is uncontrolled. Wind is probably the ideal. This will spread downwind but the spread is well-defined. If spraying is to be controlled at all, application conditions must be selected and droplet size controlled (this is called quote Controlled Droplet Application unquote or CDA).

Sudan:

- A) Existing civil aviation aircraft inspection guidelines are adequate if enforced.
- B) Verification calibration and continuing monitoring of spray equipment should be the responsibility of the contracting officer.

--- Every plane of aerial treatment must have a navigability certificate in due form. We should make sure that the plane has the number of sufficient hours of flight before its next visit. The change of planes during a campaign are harmful. Burkina Faso: Gana Diagne

3. What should USG position be on drift vs. precision spraying?

- As far as grasshopper control goes, drift is off. Even in cropland spraying, some drift into neighboring pasturage increases control efficiency. The problem is when spraying takes place around populated areas where drift can be hazardous to the health of people and animals. In this case, when USG donations are supporting the control operations, more precise spraying should be encouraged. Mauritania: W. B. Thomas
- Drift spraying is a technique to cover as large an area as possible with as few aircraft (or ground based equipment) as possible. Precision spraying assumes adequate equipment is available and recognizes a greater importance of minimizing unnecessary or non-targeted pesticide application. Burkina Faso, Niger: C. Kelly
- Drift spraying does not meet the needs of the heterogeneous nature of the Sahel ecological environments, not to mention the needless pollution risks.
- In The Gambia there should be no aerial drift spraying due to population density and water abundance. The Gambia: A. McKenzie
- USG should continue to advocate precision spraying. Senegal: E. Huddleston
- On my March trip to Niger and Gambia, I was faced with the subjects of drift vs. precision spraying and I worked out some mathematical comparisons and economics. As an operator, I have worked with both techniques with helicopters. I am also aware of the USDA guidelines for swath widths of various aircraft, many of which are not up to date and are presently under review. These are applied to precision spraying of cropland or limited size forest areas. The USDA uses the "extended swath" or "drift spraying" of "ultra low volume" (ULV) materials on their rangeland grasshopper programs. Review of literature indicates that this method of ULV drift spraying has mostly been used on African locusts successfully without undo problems.

From what I have observed of the African environment for locust control any attempt at precision spraying is out of the question and economically expensive. Automatic guidance systems which are not available for small aircraft would be required. As a consequence, an aircraft properly ULV calibrated for a 100 meter or 300 foot effective swath has the best opportunity for coverage, allowing for normal variations in flight paths which would be expected under these conditions. Proper experience of pilot and training along with use of flagging with jeeps and mirrors where possible would offer the best approach to accuracy. Back to choice of pilots, it would be important to select only those who have had experience flying on "line of sight" work without marking support. Examples would be forestry and rangeland type spraying. A pilot trained in restricted cropland work or only flagged swath work would have difficulty on the African desert. Niger, The Gambia: C. M. Voss

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- I believe we must "go" with currently accepted USDA practice. Operating in the host nation is not an "opportunity laboratory!" Senegal, Mali, Burkina Faso: R. G. Adams

- Grasshopper spraying is done during morning hours when winds are light and variable in direction. Drift spraying, by contrast, depends on there being a wind and one which varies much in direction so drift spraying can only be done when the prevailing wind for the area has begun to blow. This is almost always after the air and ground temperatures have exceeded the limits for spraying.

There is no equipment available for changing rates in flight while maintaining the desired droplet spectrum. If an aircraft is set up for drift spraying and the correct conditions do not exist, the applicator is overdosing or skipping the rest. Thus, drift spraying should not be used or condoned by AID. J. A. Henderson

- Each has its advantages. Drift in large contiguous areas while precision should be used adjacent to populated areas and cropland. Chad: P. W. Orr

- This could become an important consideration if environmental regulations are established or enforced. Chad, Niger: J. J. Drea

- There should be no ambiguity in the USG position. Drift is a misapplication under all conditions and should not be allowed. Ground observers should halt the operations when ground and atmospheric conditions make drift unavoidable. The aircraft can be equipped with recorders that can verify the flight path, rate of applications and altitude of the aircraft. These are factors of precision spraying under the control of the pilot that can be verified by checking the recorders after flight. By this means it should be possible to determine whether any drift that occurs is due to the lack of precision flying or to bad judgement from the ground. A premium for careful application should be paid to those who comply by equipping their aircraft with the recorders. Senegal: K. Seethaler

- Drift spraying is not often practiced in the U.S. due to the problems of contamination of nearby properties or sensitive areas. Drift spraying has been utilized successfully for many years in semi-Arid and Arid areas of Africa and the Middle East for locust and grasshopper control. In areas of very sparse vegetation it is often the most effective means of treatment as the pesticide must work on contact with the insect. More surface area of the insect is exposed to drift spraying. Where drift contamination is not a problem it is an efficient and economical treatment method. Senegal: G. E. Gavin

- Develop criteria based on weather conditions, type of aircraft, pesticide formulation, pesticide application systems, that provide guidance on application periods. USG position should be to minimize drift of any pesticide outside of the targeted area. Mali: L. Yarger

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- If you have to spray aurally, you might as well be precise. With the pesticide that have been used, I'm not as concerned with human and domestic animal health, as I am with the effect of pesticides on beneficial insects. Blanket spraying is likely to lead to outbreaks of stalk borers, Heliothis, and other insect pests. Senegal, Mauritania, The Gambia: B. Overholt
- AID should remain flexible with regard to drift vs precision spraying. Experience in Chad was that Canadian spray pilots started operation with precision spraying but quickly learned that drift spraying can be effective provided that the area covered is not too wide so as to reduce the efficacy of the pesticide. It is also important to ensure that pesticide does not drift on villages or other populated areas. Chad: USAID
- This does not need a special policy as the in-country project supervisor has the responsibility of determining and limiting droplet size, time and conditions of spray which influence drift. anonymous
- Drift spraying should be practiced. Chad: V. Diefenthaler
- The following response made by Symmons, which has been edited slightly, provides the most comprehensive answer to the question: Spray is produced in droplets which vary in size from a couple of microns (M) which is mist to 300 microns, which is a small rain droplet. 200 M is about this. The smaller the droplet the more effective it is (it seems to be the number of droplets an insect collects not the amount of insecticide to collect. That is not because it drifts - provided you spray in a wind - but because small droplets follow the air flow around objects and do not impact. The stronger the wind the more likely it is the the droplet will impact. The "in a wind" proviso goes against common sense. Wind close to the ground is slowed by frictional drag with the ground. This effect gets weaker as you get away from the ground but continues up to roughly 300 meters this is the "boundary layer". Change in velocity (with height), or sheer causes eddies which mix the air and the small droplets floating in it. Therefore, large droplets fall rapidly by gravity and are usually wasted, and in any case do not kill very well per unit of pesticide. Very small droplets do not collect and eventually get dispensed upwards. Medium sized droplets get brought near the ground by mixing and are "captured" by vegetation and insects or indeed anything else. No one knows what the ideal droplet size is - and the ideal will vary with weather and vegetation structure. 100 M sprayed in a steady large droplets are sprayed in still air, vast numbers of small droplets will be produced which can go anywhere. In the states, legislation requiring aerial spraying to use 200 M droplets only was introduced but had to be rescinded. First no equipment can fulfill the condition. The attempt to fulfill the requirement meant a vast increase in pesticide. Third, as a result, pests became more and more resistant. Sudan: GH/L Program

- How precise is the drift? Are results of drift acceptable/predictable? Otherwise requires precision spraying. Guinea-Bissau: J. A. Franklin
- The Mission supports targeted application of pesticides; i.e. precision type spraying. Mali: USAID/Bamako technicians
- In our opinion, this debate should not exist. As we are busy with the protection of the environment, we should avoid ground pulverization because in this exercise the whole area comprised is pulverized. Precision pulverization as its name indicates is more precise and minimizes contamination risks. Burkina Faso: Gana Diagne
- Wide area spraying is preferred since it is less noxious to the environment. Ouagadougou, Burkina Faso: Peter Dettmar

4. Can advance, campaign-long flight clearances for control aircraft be negotiated with governments?
- Yes. This was done in both Niger and Burkina. The initial approval in Niger was very lengthy, but subsequent operations went without hitch (in terms of official clearances). Other problems developed in Niger and Burkina due to security concerns at the local level, exacerbated by poor communications. It appears the francophone countries all have "working aircraft" classifications which permit spraying operations and, usually, the use of temporary landing fields, for spray aircraft and helicopters. Burkina Faso, Niger: C. Kelly
 - Advanced, campaign-long flight clearances should be required before and assistance is provided. Senegal: P. E. Huddleston
 - I would hope that seasonal flight clearances could be negotiated with governments for convenience and continual spraying time without delays. I have no information as to how this has worked out in the past.
 - Yes. Senegal, Mali, Burkina Faso: R. G. Adams
 - Yes. Chad: P. W. Orr
 - It seems imperative that they be negotiated. In the absence of these clearances, timely insecticide application cannot be assured with serious consequences for overall control effort. Senegal: K. Seethaler
 - For Chad, there was no problem in obtaining immediate clearance for aircraft entry into the country. However, due to the security problems, USAID and the aerial treatment contractor were required to obtain daily flight clearances from both GOC and French military. Advance clearance in these cases was not always possible. Chad: USAID
 - No/yes but must be adjusted continually due to security considerations in some sort of the locust breeding areas. Ethiopia: USAID/Addis Ababa
 - All respondents said yes except for one who didn't answer. Four of these said it can be done through the civil aviation authority. Two said it should be organized well in advance. Note: This is particularly critical for DLCO/EA if it is to act as a first response mechanism. Sudan: GH/L Program
 - No, a full flight clearance requires specific information on aircraft type, registry number, valid insurance, pilot's name passport number, and call sign prior to granting the clearance. Mission had no problem in 1987 in granting clearances when the above was made available to Mali's civil aviation within 3 working days. Mali: USAID/Bamako technicians

--- We think that flight authorizations for the whole campaign can be obtained without problems without reserve to provide in time necessary information concerning the plan (type, No. of license, plate, etc....) and the pilots. Burkina Faso: Gana Diagne

--- As it is in the interest of the government in the first place, there should be no problem in obtaining the said authorizations; it would, however, be useful to furnish the authorities concerned with all the necessary information at the appropriate time. Ougadougou, Burkina Faso: Peter Dettmar

LX. TRANSPORTATION

1. Was international transportation adequate for control efforts? What suggestions would you have for future campaigns?

- Transportation was adequate. Port clearance and onward handling were only delay points. The capacity to deal with the locust emergency should become institutionalized in the National Crop Protection Service. Cameroon: J. Dorman and M. Lang
- No. Late arrival of ordered vehicles. After end of control final report, essential (must be) items be ordered in advance. Cameroon: L. Soumare and A. Giner
- Internal transportation was adequate in Chad. It is important, however, to transport commodities prior to the onset of the rainy season. Chad: USAID
- Capacity exists in Chad. Funding for transport was missing. Donors should provide funds for transport of the goods they contribute. Chad: V. Diefenthaler
- No, vehicles for survey, transportation, and spraying should be made available and be put in reserve for normal and emergency control needs. Donors should be willing to extend their assistance at all times rather than rushing last minute and spending large amounts for airlifting requirements. Internal transportation during 1986/87 Locust Campaign was inadequate in Ethiopia. Suggest further strengthening of the National Locust Control Unit by supplying vehicles through bilateral agreement. Strengthen and increase the level at which FAO negotiates so that it can involve itself in supporting cross-border work. Additional trucks would facilitate pre-positioning and distribution of pesticides, dust and spraying equipment. Ethiopia: USAID/Addis Ababa
- Three people said transport was adequate. Suggestions for the future included the following: a) Airfreighting chemicals is probably well advised due to customs delays in Port Sudan; b) early purchasing of insecticides and spraying equipment to arrive in Port Sudan well before the rainy season; c) establishing a pesticide bank which would allow for chemicals to be airfreighted as needed. Sudan: GH/L Program
- No. A heavy truck and several unimogs are needed coupled with warehouse construction and on/off loading ramp. Guinea-Bissau: J. A. Franklin
- Light transportation was generally acceptable in Mali during the 1987 campaign. Support was given to the local CPS by several donors for purchase of vehicles, rentals and logistical support. Without the provision of heavy trucks by AID, CPS trucking would have been inadequate for positioning of resources (fuel and pesticides). Mali: USAID/Bamako Technicians

- Internal transportation was adequate in view of the low level of activity in 1987. In future campaigns, use of large aircraft would greatly reduce transportation needs for aerial operations. Senegal: E. Huddleston
- Yes, in the Senegal campaign of 87. By utilizing the budget expertise, incorporated in the "Finance Section Chief" responsibilities of ICS (Incident Command System), and the local Motor Pool Manager - also incorporated into the ICS team - we had adequate transportation with the least impact on the Mission. Senegal, Mali, Burkina Faso: R.G. Adams,
- Transport of pesticides appeared adequate in my experiences, but there was a deficiency of transportation for survey personnel. A justifiable level of transportation support must be determined by Mission personnel. Sudan, Mali: G. A. Schaefers
- Internal transportation was adequate in Chad. Future campaigns would be more efficient if more small fixed-wing aircraft and helicopters could be made available. Pre-positioning of fuel and maintenance facilities would be required. Chad: P. W. Orr
- I was not present during the Control Effort. However, investigations during the 1987 planning stage revealed that transportation was a serious problem for ground based personnel of the CPS in the 1986 campaign (please see my report dated 20 April 1987). The distribution of molybdates for CPS agents would enable them to get away from the offices where they were accomplishing very little, and spend more time in the field where they could serve some very useful functions. Senegal: F. M. Philips
- In Mali and Mauritania, ground transportation was a bottleneck. Need more aerial transportation with strategic caches of four wheel drive trucks. Mali: S. Tunnock
- The internal transport system was extremely inadequate. This was especially true for the pre-positioning of pesticides for the early season. By the time donors finally came through with resources, it was much too late in the season to do a good job. In looking ahead to next year, it would be advisable to start earlier and radically improve the transport system. This may not even be possible in the near future. Mauritania: W.B. Thomas
- Yes. In Niger and Burkina the volume of pesticides and related equipment which required transportation was significantly less than the volumes handled for food assistance. Given adequate funds, private and public sources of transportation are adequate for similar levels of operations in both countries. There was, at times, a lack of vehicles for field survey in Niger. This situation has improved slightly with the donation of several vehicles by the FAO and Italy, but given the large areas in Niger to be monitored, access to additional vehicles will be needed in the future. An adequate number of field vehicles were generally available in Burkina during the 1987

program. After vehicle problems in 1986, the Crop Protection Service was given a number of vehicles (FAO, Italy, CIDA) and borrowed vehicles (Liptako Gourma, Min. of Ag.) for the 1987 program.
Niger, Burkina Faso: C. Kelly

- Strengthen local institutions and have a blue print for emergency operations ready. The Gambia: A. Laurence
- By long-term institutionalization of IPM since monitoring is the key to any success. AID should have contingency plans to act immediately (or verified field data) to prevent delay in operations. Delays act to increase problems in subsequent years. The Gambia: A. McKenzie
- The Crop Protection Service requested they be supplied with some 25 10-ton heavy trucks. I still feel that this vehicle is indispensable as it could, in between campaigns, transport the products and equipment to the various main centers. Niger: M. Germaux
- This is a very difficult operation, especially since the necessary means are not always available. In our case, international assistance has not failed us. We hope that this assistance will be increased in the next crop year. Mauritania: Tahara Galledou
- In-country transportation system was weak during the 1987 Grasshopper/Locust Campaign. One should procure more flying hours for supervision and liaison and resources for the rehabilitation of damaged airstrips. The provision of vehicles and adequate operating funds will help. Without these means, donors should consider paying for air transport during the campaign. Chad: Ngaromillet Michel
- Internal transportation concerning products and materials were sufficient thanks to the assistance of the National Drought Commission (CNLES), of UNICEF and PAM.
- Instead, in spite of the recovering of several vehicles of different services by the government and the assistance of local FAO, internal transportation for prospecting teams have not been sufficient. Besides the unavailability of vehicles inside the Crop Protection Service did not allow to proceed with the installation of talkies walkies for signaling. Burkina Faso: Gana Diagne
- Transportation for materials and chemicals was sufficient; however, it would be desirable to better equip surface survey teams with means of transport. Ouagadougou, Burkina Faso: Peter Dettmar

X. INTEGRATED PEST MANAGEMENT

1. Should AID's ad hoc approach to the locust/grasshopper problem in Africa lead to the development of a permanent "planned emergency" response capability, that can be activated if and when required? Alternatively, should AID act on an emergency basis only for the purpose of regaining the status quo, and anticipate that future locust/grasshopper threats will be mitigated by long-term institutionalization of the IPM process? Finally, what role should AID play in the IPM institutionalization process?
 - Yes, AID acts a catalyst. As long as the member countries do not pay their dues it is difficult to help the Regional Organizations. Cameroon: L. Soumare and A. Giner
 - AID Official should act on emergency basis. Cameroon: S. Njymian
 - For the Grasshopper/Locust problem in Africa, AID should only act on an emergency basis. For Chad, institutionalization of IPM should start through training at this time. Other investments at this time would require extensive long-term expenditures to develop a Crop Protection Office which is now virtually without resources. Experience with the Regional Integrated Pest Management Project indicates that little can be gained from such investment in Chad at this time. Chad: USAID
 - An IPM Project would be very difficult to implement as climatic conditions change radically from year to year in the Sahel. The problem should be treated on emergency basis only. Chad: J. E. Ohabvike
 - AID should act on an emergency basis only for the purpose of regaining the status quo ante. The establishment of Permanent Emergency Office is preferred. AID should strengthen and streamline IPM Institutionalization Process. Ethiopia: USAID/Addis Ababa
 - Six people failed to respond to this question. One person answered affirmatively but did not elaborate. The three people who responded to the question all seem to agree that the development of a permanent response capability is necessary and that the national units should be upgraded to a level where they can be fully occupied on surveys during an emergency. One of the FAO consultants said that emergency contingency plans with considerable donor material and Expatriate Staff input should be in place. The other consultant felt that acting on an emergency basis only is inappropriate because emergency aid is costly and largely ineffective as no indigenous mechanism would evolve out of a stronger PPD, and that this is prerequisite to establishing an effective IPM Process. With regard to the IPM Process, this respondent felt that further research was necessary into bioagents, migration fatigue and suicide, and migration patterns. In addition he feels pesticide dosages may be too high, requiring high outlays of foreign exchange and increased damage to the environment. Emergency contingency plans with considerable donor

material and expatriate staff input should be in place. Sudan: GH/L
Program

- First drop the term IPM. It is misleading in emergencies and unrealistic to think the Locust/Grasshopper cutbream threat will be mitigated to any extent in the foreseeable future by some IPM Process. Too much work needs to be done first to see if/what approaches are possible, and USAID's attention span is not long enough. Yes, a "Planned Emergency" response is needed. Guinea-Bissau: J. A. Franklin
- No, AID should promote institutionalization of a CPS adequate to meet the challenge of Mali's Crop Protection problem. Mali: USAID/Bamako Technicians
- We must go from the point source approach to the creation of a permanent forecasting network. This would greatly decrease the cost of interventions by better planning of control operations. With this method, I think that the acridian problem would be better controlled. The role of AID can be their technical, material, and financial support. Mali: S. Sountera
- Should AID's ad hoc approach to the development of a permanent "planned emergency" response capability, that can be activated if and when required? Alternatively, should AID act on an emergency *quo ante*, and anticipate that future locust/grasshopper threats will be mitigated by long-term institutionalization process? Grasshopper/locust problems are always going to be cyclic and unpredictable. A permanent, planned emergency response capability can be maintained with a few consultants who can maintain their experience base through periodic TDY assignments. These same consultants could help in the long-term institutionalization of the IPM process. AID will have to provide some funding, perhaps at a low-level on a specific project by project basis. One model might be to use third year Peace Corps people to monitor a set of projects not to exceed \$20,000 each with very specific objectives and a methodology for evaluation. Senegal: E. Huddleston
- An integrated pest management approach and a "planned emergency" response capability should be a long term goal. Reliance on pesticides will be required under outbreak type heavy infestations. However, in Africa, there can be reduced applications of pesticides by proper targeting (helicopter surveys and others), use of safer pesticides (chemical and efficacy tests in progress), proper timing (based on species and growth stage), and minimum pesticide (based on spray droplet size formation and dosage studies). This latter is part of a Norwegian study in Mali on which we are trying to secure information. Improvements in application technology in the US and other countries can be adapted as fast as developed. Research on this use of biologicals and non-chemicals should be encouraged in the future. It should be recognized that the same resources can be used for the control of other migrant pests. Niger, The Gambia: C. M. Voss

- The ad hoc approach appears successful for the 1986-7 campaign. A planned emergency response is the least capability required for more severe outbreaks. I favor long term efforts in development of IPM programs for locusts/grasshoppers in Africa. Because the problem is international it is not likely that any single country is going to engage in institutional strengthening in L/G IPM. AID, in cooperation with PRIFAS, FAO, DLCO/EA, or other such organizations, should facilitate a research network promoting IPM and keeping control technology current. Sudan, Mali: G. A. Schaefers
- USG would be in a much better position to use the "planned emergency" response to pest control projects in the Sahel. This response should consider early intervention and treatment of low-level building pest populations before they have built up to extreme levels. Implementation of an Integrated Pest Management System for locust/grasshopper management in the Sahel in Chad is many years in the future. Implementation of an IPM program even in a technologically advanced country is extremely difficult today. Chad: P. W. Orr
- I believe the "permanent 'planned emergency' response capability" is the way to go. The analogy exists in the National Wild Fire Coordinating Group (NWCG) and their methods, i.e., ICS, are applicable and available for tech. transfer. Senegal, Mali, Burkina Faso: R. G. Adams
- I think it would be well advised for AID to develop a "Planned Emergency" response capability that can be activated if and when required. An "Operations Manual" should be prepared to assist in the orientation of future campaign efforts. Given the cyclical nature of Locust/Grasshopper infestations, it seems that there will be, for some years to come, a "crisis atmosphere" associated with them. Therefore, we should expect emergencies. It is hard to be optimistic that the IPM process can significantly mitigate Locust/Grasshopper threats for quite some years into the future. That is not to say it shouldn't be attempted and it seems a very worthwhile area for AID to be involved with the Host Governments. One must hope that over the long run, IPM will present an alternative to crisis management and extensive pesticide application. Nevertheless, the situation in Africa seems to offer more environmental complications than that in the U.S. where to date IPM is meeting with only limited success. Senegal: K. Seethaler
- Development of a "permanent" planned emergency response. The investment in establishing the National Crop Protection Service and its trained personnel should reduce, if not eliminate, the need for massive outside intervention in the future. This ideal situation will take time to accomplish, less in Niger than in Chad, due to the uncertain political wartime situation in Chad. A long term institutionalization of the IPM process should be the goal of AID although how realistic this goal is at the moment is at best uncertain. The role of AID should be one of supplying technical assistance and supporting experimental trials to develop IPM for the countries. This would include supporting researchers to establish

research projects within the country involved to develop IPM approaches. This could be in conjunction with FAO but not on a permanent basis. Chad, Niger: J. J. Drea

- Yes, "develop a planned emergency response." Also, strategies that are aimed at attacking the "problem" when pest populations are low could thwart development of serious outbreaks. USG should strive to train persons in-country in IPM principles so that IPM will take hold and lead toward getting a better handle on pest management. Mali: L. Yarger
- A permanent "planned emergency" response? -- Absolutely. Although, as I have stressed above, host country institutions need to be strengthened during a long-term effort. The history of grasshopper and locust problems in Africa during this century teaches us that there will be periodic regional outbreaks beyond the capabilities of any one country to defend against by itself. The experience of OCLALAV and OICMA have shown us the pitfalls of building institutions which would be capable of taking care of the outbreak periods (perhaps) but which are underutilized during non-outbreak years. Furthermore, there is no real hope of even the best IPM operations ever eliminating the periodic outbreaks. Therefore, as I have stressed above, institution building is essential to the extent of establishing effective host country scouting, communication and sub-outbreak control capabilities. These operations within each country would stress training, logistics, information gathering and readiness. During outbreak years, these host country institutions would serve as the backbone for a regional control effort, allowing for the rapid decentralized deployment of equipment and pesticides, and providing a pool of well trained and experienced scouts and applicators. Any "planned emergency" response program must be joined together with long-term institution building program since the two are necessary complements to each other. Burkina Faso: W.H. Settle
- The ecology of the Sahel is changing. Whether grasshopper outbreaks will occur more often than before is unknown. Does AID have the capability to remain in a state of "planned emergency"? If so, it may be the way to go depending on costs. An alternative may be to support regional organizations such as OCLALAV. As before, I am an advocate of long-term institution building in crop protection. AID should be highly involved in this type of program and it should be on a bilateral basis. This would compliment OEO's role as a fire fighter. It is easier to fight fires when there is someone on site who knows when and how it got started. Senegal, Mauritania, The Gambia: B. Overholt
- Some sort of an institutionalization process will eventually have to take place, as the ad hoc approach cannot go on much longer. There must be a time in the future when the host country takes control of the more normal grasshopper/locust control efforts, and is able to work on this level without massive donor support. In such a case donors could play more of an emergency response role to high population levels and large invasions. This sort of approach will require further research in order to be able to predict such

invasions far enough in advance to be able to offer assistance that will have an impact. Mauritania: W. B. Thomas

- AID should, over the medium term, develop an improved disaster response capacity in Sahelian countries which includes improve management and planning for grasshopper and locust problems. The technical inputs for the Crop Protection Service should be well defined, minimal and oriented toward emergency operations. Other facets of improving the Crop Protection Services should be dealt with as development activities. This minor and low intensity effort with the Crop Protection Service should be complemented with efforts to improve the host government ability to manage and respond to disasters. The host government should be given the key role in ensuring the Crop Protection Service has done adequate planning and can respond to developing pest problems. AID/W's decision to terminate the Integrated Pest Management Project in the Sahel exemplifies AID's short-term attention span and its inability to be a leader in long-term institutionalization processes. Other donors, the FAO and host governments would look with bewilderment and cynicism on any such attempt by AID to play such a role so soon after it had precipitously abandoned it. Burkina Faso, Niger: C. Kelly
- AID assistance in strengthening crop protection should be based on IPM concept (as it was before). The Gambia: A. Laurence
- No to the first part of question 1. Proceed "smoothly" when dealing with the IPM institutionalization process. Niger: F. Boillargeon
- In view of the extent of the nearly annual infestations, there is reason to create a permanent emergency response capability, which would be the work of donors and recipient countries. The commission assigned to this work would be defined by mutual agreement. Institutionalization of the operation would allow for better organization and management, from the prevention to the intervention process. AID should be the driving force behind this operation. Mauritania: Tahara Galledou
- It is time to move from AID emergency interventions to the creation of a permanent organization to control grasshopper/locust plagues. It is important to consider integrated insect control management as a long-term process. USAID's major role can be to provide technical assistance, materials and financial resources to the new organization and to monitor its management. The objective will be to increase the organization's managerial capacity to mitigate crop losses due to grasshopper/locust infestations. Chad: Ngaromillet Michel

XI. ROLE OF REGIONAL LOCUST CONTROL ORGANIZATIONS

1. Should U.S. support the strengthening and/or revitalization of regional locust control organizations? If so, how and what kind of support should the U.S. provide and to which organizations? Should the U.S. support capital investments, e.g., facilities and equipment?

--- An indigenous effort will no doubt be most effective as long as it is kept abreast of regional developments through FAO or another regional mechanism. Cameroon: J. Dorman and M. Lang

--- Most regional Locust Control organizations were too large (e.g. OCLALAV and CICMA) and too far from zones of action. Smaller regional organizations like the lake Chad Basin Commission regrouping not more than a few countries should be encouraged and strengthened with facilities and equipment. Cameroon: S. Njymian

--- AID should not support the strengthening nor revitalization of regional Locust Control Organizations. AID should encourage private investment for pesticide distribution and aerial spraying services. Chad: USAID

--- Yes, regional organizations are serving multi-national interests not only in locust control but other migrant pest control. The capability requirements are long but the following are a priority spray: aircraft, field vehicles, pesticides, camp equipment, operational expenses, and storage facilities. DLCO/EA needs to be supported through FAO. The support should be aimed at strengthening the air fleet, provision of helicopters, etc. U.S. support should be negotiated in accordance with interests of other donors. Ethiopia: USAID/Addis Ababa

--- All respondents agreed that USG should support the strengthening and/or revitalization of Regional Locust Control Organizations. Several mentioned that the DLCO/EA should be provided with modern control equipment, pesticides and a new fleet of aircraft. Such support will help other countries in the region to control locusts, thereby minimizing the rate of locust invasion or breeding in Sudan. One Sudanese respondent emphasized that the USG should concentrate on strengthening the national control units which are the foundation of regional coordination. Both expatriate consultants maintain the problem is not one of capital inputs, but of reorganization and management. Answers varied from "quite responsive" to "limited" variable to "not responsive". Two answers mentioned only that two plans were provided during the season. The TLD Consultants said aircraft were slow in being provided, but that this was not always the fault of the DLCO/EA. Crews were variable in that one was good, the other uncooperative. Note: DLCO/EA seems to be hampered in its Sudan Operations by the Sudan bureaucracy which insists that DLCO/EA aircraft clear Khartoum even when moving from Asmara to Kassala, for example. Valuable time is lost waiting in Khartoum for Civil Aviation clearance, and even longer delays are incurred by Sudan's requirement that the pilots have a new Visa each time they come here. Standard operating procedures for an automatic Civil Aviation

clearance are needed.. For the future, the Steering Committee plans to approach the GOS to grant similar courtesies to DLCO/EA operating in Sudan. It is noteworthy here to mention that one of the strengths of the Steering Committee is its ability to intervene on behalf of one entity to help resolve operational constraints in an emergency program. Sudan: GH/L Program

- Organization/Facility under FAO (not CILSS) in West Africa will be a small core of people headed by an experienced manager. (Not necessary to be Phd. or a Grasshopper Specialist). A small IITA for Work/Coordinating work on Grasshopper/Locust and other pest prone to outbreaks. No individual's assignment longer than 3 years. Outbreak assessment, training. Technical/Financial assistance to National Researchers and CPS to be some components. 10 needs (Long/Short term) to conduct studies as basis for predicting outbreaks, establishing/developing Plant Pest Regulation Strategies (PPRS) and standardize procedures. Each country interested in future donor support for pest outbreaks will provide/assign one full-time qualified scientist (Phd.) from their National Agricultural Research Institute to support CPS and this researcher will be provided financial support by donors through the "Small IITA" and directo bilateral assistance for approved specific projects/research. The more objectives accomplished the more resources provided. English/French language will be required by the selected National Researcher and counterpart CPS employee (M.S.) and will be provided by an appropriate donor if needed. This is to permit best technical assistance possible without language constraints. No national support--no donor support. Provide financial support for /Phd. thesis work by Americans on specific/identified studies in Africa identified by "Small IITA". Provide financial support to the Association of African Insect Scientists for a section on Grasshoppers/Locust during annual conference of a separate conference and publications (by Africans) on Grasshoppers and other Plant Pests, etc. sponsor in Africa meetings by Small Planning Groups of involved Africans. Support/establish inter-country support network/working relationship were needed (I.E. Morocco, Mali, Mauritania, Guinea-Bissau: J. A. Franklin
- No, we do not support West African Regional Locust Control Organizations. We re-emphasize that the host country CPS is responsible for the control of pests, including locusts if necessary with targeted resources from donors. However, we do see a need for an information coordinating body. Mali: USAID/Bamako technicians
- Aid in this area can be in the form of a permanent and efficient monitoring and inspection network which is, in my opinion, the weak point in operations and the key to success. Mali: S. Sountera
- Regional control organizations become bulky and top-heavy but there is a need, especially for locusts which do not respect national boundaries. For the problems of Senegal, strengthening of the CPS may be more cost-effective. Capital investments in buildings, and aircraft should be considered very carefully. In all likelihood,

aircraft can always be contracted cheaper than trying to maintain them and the personnel required. Senegal: E. Huddleston

- The US and other donor countries should, I feel, support to some extent, the recommended improvements for the Desert Locust Control Organization (DLCO/EA), some of which are listed in the Parker report (D.O.A. Cranfield England). We secured a copy of this on our Cranfield visit. Host countries provide the annual operating costs but may be unable to finance need updates on airplanes and helicopter equipment. From my visit of DLCO/EA facilities in Nairobi and Addis Ababa, it is obvious that here is a functioning organization that has over the years provided a necessary service to the region. It is in need of modernization and reorganization of top heavy administration. An experienced agricultural pilot/flight instructor as is being considered from England, if given the position of Chief Pilot, could result in improved pilot morale and capability. Niger, The Gambia: C. M. Voss
- Yes. I think the most helpful thing(s) would be managerial and operational training, plus limited capital investments. Senegal, Mali, Burkina Faso: R. G. Adams
- I am only familiar with DLCO-EA. and I support strengthening this organization. Operational costs should be supported by member nations and should be justified on an expanded area of responsibility, e.g. not only grasshopper/locust control. The UGS should support capital investment in collaboration with other donor nations. Sudan, Mali: G. A. Schaefers
- Regional locust control organizations were successful at one time. It may be cost effective to revitalize them and provide funds for training, equipment, and facilities. Chad: P. W. Orr
- Given that grasshopper and locust outbreaks seldom are confined to a single country, it makes sense that regional control efforts should be encouraged. I do not feel that I am sufficiently familiar with the structures and functionings of the regional organizations to make specific recommendations on how to go about this. It is likely that, given the present shaky viability of some of these organizations, it is expeditious to work independently of them. For the short term that may work out best, but for the long term development of the region, ways should be explored to strengthen or revitalize them. Senegal: K. Seethaler
- Considering the geographic scope of the problem with locusts, a regional approach. PRIFAS may be an organization that could take a lead role in a regional control organization. Support for the Agrhymet program would be beneficial to a regional structure. Chad, Niger: J. J. Drea
- Regional Organizations in which the member governments have failed to support at even minimal operational levels do not appear to be good risks for assistance. This leaves only DICO-EA and IRLCO. Any

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assistance to DLCO-EA should hinge on their reorganization to reduce expenditures and their discontinuance of the use of the chlorinated hydrocarbon pesticides. FAO sponsored Regional Organizations may require emergency assistance if and when they exhaust their trust funds under outbreak conditions. Senegal: G. E. Cavin

- Yes, I believe so. Although I'm probably in the minority, I think OCLALAV is worth saving. At one time they were very effective. They still have quite a few highly qualified people (and probably some dead wood). The problem faced by an organization that responds to emergencies is that when there aren't any emergencies for several years, the powers with the money decide to organization isn't cost effective. Also, nobody seems to notice when they are doing a good job. The fire is stamped out before anyone notices there was a fire. Is AID willing to provide long-term support to this type of organization? Senegal, Mauritania, The Gambia: B. Overholt
- Yes, the U.S. should support regional Locust Control organizations. After watching the preparations for the locust control operations in Mauritania, its obvious that this country really has very little resources of its own, and must scrounge from the donors to have any sort of a control force. It is a much better use of resources to support a regional organization that works with control efforts of the host countries, rather than each country having to set up its own control organization. However, it seems that the pendulum is swinging away from regional control, toward country specific control. Although this may be the best long term solution, what it will do now is to increase demands on donors, as well as to contribute to future emergencies because of sloppy control campaigns that are not timely or efficient. Mauritania: W. B. Thomas
- OCLALAV should assume a role as a regional coordination unit with resources for communications (radios, which exist), training, specialized assessment and technical advice on survey and control operations. The actual survey and control operations should be delegated to the national Crop Protection Services, who have responsibility in each country. The idea of increasing the role of the national pest control organizations also takes into account the need to rationally use available resources and support recurrent costs. Locust control is not a year to year problem, but cyclic over a number of years. The costs of keeping a large organization functioning over the slow years has not proved to be possible in the case of OCLALAV. Burkina Faso, Niger: C. Kelly
- Very useful to revitalize OCLALAV. They should be supported with purchasing and maintenance of equipment and training field staff. Each potential campaign country should have a well trained OCLALAV emergency team (drawn from CPS staff-special assignment). However, strengthening should only be started after firm commitments by local governments concerning contributions in money and kind (e.g. staff, salaries, fuel). The Gambia: A. Laurence
- Grasshopper and/or locust control is a national program which should be carried out by the national services, which are likely to be more

motivated and efficient than any other regional organization. OCLALAV was created during a time when the CPS did not exist. But, unfortunately, it's then glorious performance now belongs to the past. The CPS should now take care of the locust control issue. The process is underway. Of course, a regional organization--OCLALAV, CILSS, FAO, PRIFAS--will take care of regional and extra regional information concerning locusts, research and training: but not the locust control campaign. Niger: M. Germaux

- Yes, but these organizations must not be allowed to decline in barren years. This is the idea of integration into an IPM program. The Gambia: A. McKenzie
- This is a rather difficult question. The means that have been placed at the disposal of these organizations by member countries and the management and use of these means should be taken into account. It must be noted that many organizations have concurrent institutional and financial problems as well as problems in the area of expertise.
- Some regional organizations are victims of their efficiency, which has made it difficult for member countries to make their contributions. U.S. support and requesting recipient countries to make their contributions in order to help strengthen these organizations would be greatly appreciated. The generally fixed budgets of these organizations should grow in relationship to the economic situation. Restructuring is necessary for some of them. Mauritania: Tahara Galledou
- USAID should support the rehabilitation of a locust/grasshopper control regional organization, particularly in the areas of insect biology and its movement, information exchange and diffusion. USAID should also support all regional organizations responsible for locust/grasshopper control such as OICPA, OCLALAV, etc. Chad: Ngaremillet Michel
- In our opinion the revitalization of regional organizations of locust control goes first of all through the translation of concrete actions of the political will and of the priority that member states grant upon them in paying exigible contributions to allow a regular operation. These regional organizations started to have difficulties and have been inefficient as soon as member states ceased to pay their contributions. No restructuration will be efficient without this political will of the member states. OCLALAV could dynamize again in that sense. Burkina Faso: Gana Diagne
- Countries of the sub-region must first decide on the strengthening and/or revitalization. Ouagadougou, Burkina Faso: Peter Dettmar

XII. SUPPORT FOR HOST COUNTRY INSTITUTIONS

1. Under what circumstances will U.S. assistance for emergency locust/grasshopper operations be used to provide institutional support for the national plant protection entities of affected host countries?
 - Emergency assistance, whether monetary or material, should be given and used for the emergency situation they are intended for. Institutional support should come from projects tuned to their specific needs and goals. However, materials provided under emergency assistance can be later integrated into the institutional entities. Mauritania: W. B. Thomas
 - There are no current plans to provide additional support for institutional strengthening of the GOB Crop Protection Service (CPS) under the Emergency Locust/Grasshopper Operation. Any support to be provided should be in the context of an on-going project of support to the CPS which, since the completion of the Integrated Pest Management Project, AID no longer has. The Canadian International Development Agency does have such a program and it might be encouraged to provide, as a complement to its present activities, for the strengthening of the CPS ongoing crop pest monitoring activities. Burkina Faso, Niger: C. Kelly
 - Emergency operations should be embedded in existing local institutions. Therefore, strengthening of the national CPS is essential (provided they let themselves be strengthened and not waste inputs.) The Gambia: A. Laurence
 - Difficult to provide institutional strengthening on an emergency basis. This needs to be a continual long term process. Emergencies will provide immediate TA input support for a set period. The Gambia: A. McKenzie
 - I have already made my views known, but it bears repeating. I do not care which donor provides the host country support, the essential point is that it be provided. As I have said already, the Canadians have done an excellent job in Burkina and this should be used as a model to study HOW and WHY it has worked so well. Burkina Faso: W. H. Settle
 - Training and advice should be a primary responsibility of every TDY Technical Assistance Specialist. Equipment and pesticides should be carefully chosen to improve the overall performance of the CPS. Senegal: E. Huddleston
 - To the extent needed to ameliorate the emergency. We can't avoid some assistance...for example: CPS in Senegal is so small - in numbers and technical expertise - that their field personnel were dealing with several field problems, i.e. rats, as well as grasshoppers. I think the joint operations center idea helped...overall. Senegal, Mali, Burkina Faso: R. G. Adams

- For ground control operations and for transportation and communication during surveys. Sudan, Mali: G. A. Schaefers
- USG should continue to provide "planned emergency" response while training host country personnel in locust/grasshopper control techniques. Such assistance should be coordinate with FAO and Donor Nations. Chad: P. W. Orr
- It is said that equipment and supplies that Donors provide for Locust/Grasshopper operations are transferred to other purposes after the campaigns. This is perhaps not such a bad thing if they would otherwise be wasted or unused or would tie up storage space. The problem is that this presents a strong incentive to Host Governments to make excessive and often inappropriate supply and equipment requests. It seems evident that the interchange of personnel and the exchange of information between the U.S. and Host Countries that occur during the operations serve to stimulate and thus provide support for national plant protection entities. Senegal: K. Seethaler
- Circumstances. In Chad, for example, the Crop Protections Service has been essentially destroyed by the war. Support to redevelop this institution would be essential. This would include training, equipping, establishing storage areas, and furnishing means for local transportation e.g. mbylettes, horses, camels, etc. Chad, Niger: J. Drea
- Under emergency conditions, GRC requested USAID intervention, which then designed a training program intended to strengthen the Crop Protection Services in the affected areas. Cameroon: J. Dorman and M. Lang
- Training financed by AID for Chadian Crop Protection Technicians was the major contribution for institution building. A second aspect which contributed to institution building was the GOS's participation in the implementation of the USAID project. Interpretation of the survey, development of an aerial treatment operation plan, development of a survey plan, recording of radio messages, and use of satellite imagery, are all activities from which counterparts learned procedures which can enable a successful operation. Chad: USAID
- Where the national service plays a leading role in coordinating activities/strengthening of host country's own resources obviously increases their own ability to cope with these problems. Ethiopia: USAID/Addis Ababa
- Five people didn't answer the question, Symmons noted that the proposed medium-term project is concerned with:
 - a. creation of a locust unit
 - b. development of grasshopper threshold control
 - c. pesticide storage and related matters
 Based on past experience, technical assistance in various areas of locust control operations can provide institutional support to the PPO during an emergency program. In addition, timely release of

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local currency is one form of assistance which can directly expand the institutional capability of the PPD to monitor and implement an emergency program. Sudan: GH/L Program

- For the long term, U.S. assistance should support institutional improvement. However, there are some apparent and immediate requirements that we recommend funding with emergency monies. These are pesticide research and in-country training, particularly in-field exercises. Mali: USAID/Bamako Technicians
- The United States should support the updating of regional anti-acridian organizations, particularly regarding the battle against the migratory locust. Since the problem of these organizations is financial, they can be given financial support. Mali: S. Sountera
- U.S. assistance should contribute to the strengthening of national entities that generally have limited means. It should also be used for training supervisory and development staff and farmers. Mauritania: Tahara Galledou
- Mainly in the areas of equipment, communication, training and operational funds. Chad: Ngaromillet Michel
- The coordination system in Burkina during 1985-86 campaigns (a weekly meeting during control campaign) and 1986-87 (a monthly meeting which would become weekly if the evolution of the campaign required it.) has been very efficient in our opinion. Besides funding planning and purchases, information exchanges have constantly been held.
- Coordination in Burkina Faso has been reinforced, in the middle of 1986-87 campaign, by the creation of a technical committee composed of all consulting experts provided by different donors under the presidency of the chief of Crop Protection Service. The reports of this technical committee on locust situation have been very useful to the consulting committee. Burkina Faso, Gana Diagne
- Coordination in the form of monthly meetings during this season was quite effective. Ouagadougou, Burkina Faso: Peter Dettmar

2. What were the roles and responsibilities of the host country?

- For the 1987 grasshopper/locust campaign, Crop Protection Service, under the Direction of Agriculture, Ministry of Rural Development, functioned as the controlling organization. This included resource allocation, decision making, and pest status evaluation, along with control implementation. Mauritania: W. B. Thomas
- The CPS throughout the emergency operation took the lead role, which is appropriate. It has demonstrated its capacity to fulfill this role. No actions should be taken which might in any manner detract from the national crop protection service's primary responsibility for emergency control operations. Burkina Faso, Niger: C. Kelly
- Host country provided field staff and fuel and general coordination. The Gambia: A. Laurence
- Coordinate and organize the donor countries. Niger: F. Boillargeon
- Fuel, local costs, vehicles, staff. These should be clearly calculated and pledged to prevent breakdowns as in the 1987 campaign. (i.e. no fuel for 6-week period, labor problems due to no money to pay back-pay etc.). The Gambia: A. McKenzie
- Host countries must carefully manage their resources and show that they have committed all the resources possible to qualify for assistance. Host country CPS must be forced into the responsibility for success or failure by being required to make decisions and act on them. The 1987 campaign in Senegal was a good first step. Senegal: E. Huddleston
- Leadership, direction, commitment, mobilization...to the extent, possible, within their capabilities. Senegal, Mali, Burkina Faso: R. G. Adams
- In Chad, the Plant Protection Agency had office space and some personnel but no financial resources to do the necessary survey work. Chad: P. W. Orr
- During the planning stage, the Host Country was to take the lead role in presenting the Action Plan and coordinating the Control Operation. Senegal: K. Seethaler
- Roles of host countries: a) obtain governmental support through memoranda of understanding, agreements etc. to ensure that any organization developed will have government sanction and will be given a degree of permanency; b) recruit qualified or potentially qualified personnel; c) develop appropriate and adequate legislation to permit the service to function in an efficient manner; d) establish a level of permanency and protection for the personnel to ensure that individuals trained and educated will remain with the service as far as possible; e) make space available throughout the country for the establishment of offices, training, maintenance, and storage areas for the institution being developed; f) inform and

direct local authorities to support the activities and goals of the institution being developed; g) inform and direct local authorities to support the activities and goals of the institution.
Chad, Niger: J. J. Drea

- Host country provided some vehicles, made contact with villages, provided some insecticide for the aerial application trials, assisted in the conduct of pesticide trials, assisted team in locating quarters, and provided overall information on the status of pest population and suppression measures to date. Technical specialists with whom our team associated with in Mali were very helpful and technically competent individuals. Mali: L. Yarger
 - The GOC prepared the plan of action and provided funds, manpower and equipment to implement the campaign with some material and technical assistance from the donor community. Cameroon: J. Dorman and M. Lang
 - In charge of overall field operation, surveying and control operations, acquisitions of locally available inputs. Cameroon: S.Njymian
- The GOC participated in all aspects of the USAID program. It's major role was to coordinate all donor efforts through the donor coordination committee. It also participated in the technical committee. The GOC provide all personnel for ground control and survey activities; however, USAID financed per diem and other field support. The egg-pod survey was implemented by GOC technician under the guidance of USAID technical staff. The GOC also provided appropriate storage and guard services for USAID pesticides and fuel. Chad: USAID
- Chaired the donor coordination committee and provided personnel. Chad: V. Diefenthaler.
 - Four people failed to answer the question. One of the FAO respondents stated it was the host country's responsibility to survey and control locusts. This echoed by one of the Sudanese respondents who said that Sudan was to provide the budget for the running costs and to provide technical staff and administration for the campaign. They were meant to assist in the transport and storage of chemicals and fuel. The GOS also provided for about 19 aircraft to be on call for plant protection activities. The GOS shared Steering Committee chairmanship with the FAO consultants, and provided weekly reports on the locust situation. In Sudan, the GOS played and considerable role in the implementation of the campaign with the donors and FAO providing inputs and guidance. Sudan: GH/L Program
 - Host countries should facilitate the channeling of assistance that is received from donor countries. They should set up regular preparatory and operational programs on the anti-acridian campaign that should be brought to the attention of the donors, who will discuss it with the host country with a view to setting up a joint program. Mauritania: Tahara Galledou

--- In principle, there should be no problem. Ouagadougou, Burkina Faso:
Peter Dettmar

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1. How effective was donor coordination during 1986-1987?

- FAO was charged with donor coordination and a national coordinating committee, which included the donors, was established. FAO had to work four months persuading the Government to create a coordinating committee. Once created, it was effective.
Cameroon: J. Dorman and M. Lang
- It depended mostly on the mutual interest relationships - some donors reacted promptly while others especially banking organizations reluctant. Cameroon: S. Njymian
- Donor coordination was very good in the planning stages of this year's emergency program. The donor coordination committee met regularly during this period and this enabled GOC and donors to establish the needs and make early pledges. Although coordination was good among donors, implementation of pledged actions by individual donors was weak. Despite the lead time available for preparation of the 1987 program, some contributions of pesticides and equipment arrived late in Chad. Aerial services were available for spraying in western Chad but there was a shortage of pesticides. By the time the pesticide arrived, the aerial service contract had expired. Pesticide stocks for ground control would have remained unused in Ndjamena warehouses if USAID had not actively searched and identified a funding source to cover transport costs. Thus, donor coordination should be extended to include implementation.
Chad: USAID
- Donor coordination was not very good. Chad: V. Diefenthaler
- Good thanks to a reasonably effective FAO. The immediate positive response by donors enabled MOA to carry out effective control operations. It has worked well but could be improved. Less bureaucracy will help to deliver the required goods at the right time. Ethiopia: USAID/Addis Ababa
- Quick promises--slow delivery--with several exceptions.
Guinea-Bissau: J. A. Franklin
- Two people pronounced donor coordination as "excellent" and two others as "very effective." Two others said it was reasonably effective but there were delays in financing and implementation. A third said delays occurred specifically in the obtaining of essential equipment, e.g., radios. Note: these radios were to be procured by FAO. Donor coordination in Sudan is achieved through the regular meetings of the steering committee of donors/GOS/FAO and through subcommittee meetings of major donors and representatives of FAO and the GOS. When required, donors meet alone to discuss financing and donations. In 1985, EEC/USAID coordinated closely in the purchase and delivery of emergency program inputs through a grant by USAID to the EEC for procurement and delivery. Other donors contributed inputs through the FAO, but for the most part, consulted with the

steering committee before placing orders to ensure that the contributions were appropriate. In 1987, there was close donor coordination between the Netherlands, USAID and the EEC. A total package was designed by FAO and donors who then divided up the various components based on their funds availability. ODA joined the program and coordinated closely with the other major donors before committing their funds. USAID added funds to the 1986 EEC grant; the EEC in turn granted a portion of the pooled EEC/USAID funds to FAO for TA. Sudan: GH/L Program

- Development of the 1987 Mali operation plan was effective and timely for donors to react. Subsequent procurement and placement of donor pledges were slow in many cases, with exception of U.S. and British contributions. Comparing our progress with the 1986 program, no pesticides or heavy equipment items were shipped by air freight which represented considerable savings in transportation costs.
Mali: USAID/Bamako technicians
- Coordination has not been effective: many delays have been noted in orders. Mali: S. Sounera
- Once things got rolling, coordination was satisfactory. The problem was timing of the country demands, and then the eventual response to those demands. The CPS usually requested a particular quantity of material goods or money at a time when it was needed, but donor support was usually several weeks in coming, as international decision-making was often required. Lateness prevailed.
Mauritania: W. B. Thomas
- In Burkina, donor coordination was good. The cooperation between donors and with the GOB led to effective procurement of materials and generally good matching of resources with means and requirements. In Niger, donor coordination was fair to poor. Problems developed with confusion over pledges and commitments of assistance, despite frequent coordination meetings and written lists of donor assistance. The lack of a special GON plan for grasshopper and locust control, the provision of some emergency assistance through, and as part of, regular development activities and language problems may have all contributed to the coordination problems. Burkina Faso, Niger: C. Kelly
- Coordination of major donors was good on informal level. Concerning equipment no coordination, esp. due to independent assistance to Italy. Donations from the EEC were based on decisions at FAO-Rome, not from local TA's/command center. The Gambia: A. Laurence
- Passable. Niger: F. Boillargeon
- Effective. Senegal: A. B. Ndiaye
- The coordination model, such as the one which functioned in 1987, may not be a universal remedy but it allows donors to be informed of the host country's needs, the satisfaction of these needs, the preparation of locust control campaign, the progress of the program,

and the possible additional needs that develop during the locust control activities.
During standstill periods, donors should continue to meet once every month to get information on the situation. Niger: M. Germaux

- Needed centralizing to prevent overlapping. The Gambia: A. McKenzie
- Donor coordination was significantly improved over 1986 by the U.S. taking the lead as Donor Coordinator. Additional improvement can be achieved by forcing CPS to prepare their Action Plan earlier and to prioritize their requests. A multi-donor TDY team may be needed. Senegal: E. Huddleston
- Donor coordination, despite a reduced pest threat, should be considered in terms of insurance. Certain resources should be in place to avert the catastrophic infestation if and when it occurs. Niger, The Gambia: C. M. Voss
- Good, I think. However, all coordination was slowed (tempered) by the continuing requirement to seek headquarters approvals. Senegal, Mali, Burkina Faso: R. G. Adams
- My experience in Sudan was that donor coordination was effective but logistics fell apart when it came to shipping and clearing entry of the goods. Sudan, Mali: G. A. Schaefer
- Not very effective; probably due to international politics. F. M. Philips
- I wasn't in a position to observe this during the Control Phases of the program. During the 1987 Planning Phase, donor coordination seemed to be an arduous and frustrating interplay of diverse interests and levels of commitment. Given the obstacles and complexity of the coordination process, however, the effort seemed sufficiently vital to muddle through it. There are numerous obstacles inherent to coordination among such a diverse group. From our perspective, it appeared that the commitment of USAID was more altruistic than that of many other donors who were only interested in financing and procuring products manufactured in their home countries. Senegal: K. Seethaler
- It was reasonably effective although there were problems of standardization of equipment, failure to live up to commitments of equipment and supplies. The National Coordinating Committee was very effective in this regard. Chad, Niger: J. J. Drea
- In Burkina, both the donor coordinating committee and the technical committee were highly successful. The communication and cooperation fostered by these groups was absolutely a key factor in the success of this year's operations in Burkina. I would say that without these meetings there could be no hope of effectively dealing with the grasshopper outbreak problems. Furthermore, I believe that many of the problems USAID has in their bilateral programs might be helped by looking at the example of what benefits come out of increased

communication between donors and host country authorities during
REGULAR meetings. Burkina Faso: W. H. Settle

--- The donor countries that did furnish assistance coordinated various
operations. They could be contacted directly, and they responded
favorably to each request that was justified by a situation.
Mauritania: Tahara Galledou

--- Coordination seems to be effective for commodity procurement but
mediocre for financing. Chad: Ngaromillet Michel

2. How does USG ensure continued coordination despite a reduced pest threat?
- USAID will closely study the forthcoming evaluation of the campaign to be undertaken by ECO, which will address future prospects. Cameroon: J. Dorman and M. Lang
 - Supply information and a reliable radio communication system. Cameroon: S. Njymian
 - USAID will continue to communicate directly with other donors to keep informed of next year's planned activities. It will also encourage the GOC to convene the donor coordination committee regularly to exchange information. Chad: USAID
 - The key is to work with donor coordinating committee. Chad: V. Diefenthaler
 - In the case of Ethiopia, by offering its continued support to FAO-MOA. Through donors meetings. Ethiopia: USAID/Addis Ababa
 - No comments from one respondent. Four respondents said a USG coordinator for pest control should be appointed to provide close liaison between USAID and the PPD. Others said that USG should support survey and control efforts and supply an information officer to follow up. Also they should organize in-country workshops, seminars and short-term consultancies. Symmons believes if the emergency threat disappears this role should devolve to FAO. USAID believes it is likely that the steering committee will continue its functions albeit on a reduced scale, throughout the duration of the medium-term program. FAO would be the appropriate focal point for donor coordination beyond that time horizon. Sudan: GH/L Program
 - Maintain country teams and U.S. technical participation in them. Guinea-Bissau: J. A. Franklin
 - The FAO and the CPS representative should keep donors informed on a frequent basis on changes/developments on grasshopper and locust outbreaks. Mali: USAID/Bamako technicians
 - Coordination should continue on a reduced level in regard to training and institution building, with emergency donor assistance in a standby mode. This way the host country can work to control the normal year-to-year infestations itself, while donor assistance will be ready to react to an emergency situation. Mauritania: W. B. Thomas
 - The FAO should take the role of coordinating overall donor assistance and act as a clearinghouse on grasshopper and locust problems in Niger and Burkina. This role is close to what has taken place over the past two years in both countries. AID should maintain normal contacts with the Ministry of Agriculture in each country for the purpose of monitoring the overall agricultural situation. Burkina Faso, Niger: C. Kelly

- Activate regular donor meetings. The Gambia: A. Laurence
- Not certain (the problem has diminished). Niger: F. Boillargeon
- Someone in the Mission will have to assume the responsibility for coordination. Perhaps a consultant could be jointly funded by the major donors or FAO to serve one or more countries. The Canadian Coordinator, Manikowki would be a good possibility. Senegal: E. Huddleston
- By keeping pest threats on the front burner and visible, this requires a lot of energy and commitment! Senegal, Mali, Burkina Faso: R. G. Adams
- "Reduced pest threat" is a relative term. Sudan, Mali: G. A. Schaefers
- Training of host country technicians--insist on establishment of sound pest survey organization. F. M. Philips
- As we work our way through the current emergency and as the crisis subsides, we are presented an opportunity to assess and plan for the next cycle of grasshopper infestations, which will surely come. The first step is to resolve to not permit this respite to let us slide into complacency. One suggestion would be to expand the interchange of information to incorporate skills that have evolved in other parts of the world. It may well be that the strategy for grasshopper control in the U.S. would not be quite appropriate for Africa. There are a number of differences in life history, ecology and behavior among the various species of grasshopper; there are differences in climate and terrain; there are political and cultural differences; and there are whole arrays of logistical factors associated with supplies, equipment, communication, transportation, maintenance, storage, distribution, etc. All this notwithstanding, there is a great deal of overlap in the objectives and all parties can learn from each other. By bringing representatives of the various countries at risk of future infestation to the U.S. to observe our grasshopper control programs at all operational levels, these representatives will have the opportunity to see how we do it. Adjustments could be made in procedures to match their situations as they see fit, but the experience will make all parties more receptive to meaningful communication on the subject of control. Senegal: K. Seethaler
- Ensure continued coordination: Establish or support a national coordinating committee with meetings on a periodic basis. Possibly this could be done through the Ministry of Agriculture which would tend to ensure greater attendance. Chad, Niger: J. J. Drea
- This can be ensured by institutionalizing the donor coordinating meeting format within each country, and widening the agenda to include the ensemble of bilateral projects across the board. Thus,

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when crop protection issues arise, they simply become the focus of an already existing infrastructure. Burkina Faso: W. H. Settle

- A reduced threat is a sign that we must prepare for a new situation. The meeting schedule can be lightened, but coordination, to a certain degree, should continue. Mauritania: Tahara Galledou
- USAID's grant to Chad has been very effective and appreciated during the 1987 Locust/Grasshopper campaign. We believe that USAID support will continue because locust is still a problem in many countries. Chad: Ngaromillet Michel
- Yes, and this coordination shall continue. Locust threat in the Sahel, in general, and in Burkina, in particular, was reduced in 1987 because of the lack of rain, a non-masterable phenomenon. But nevertheless, biological knowledge accumulated on grasshoppers allow the prediction that it exists in the Sahel an important population of grasshoppers in egg-pods (either of 1985-86 campaign or of 1986-87 campaign) which in case of normal rains occurrence in 1987-88 would entail another important invasion of grasshoppers. Burkina Faso: Gana Diagne

3. What should be the continuing role of FAO and CILSS in coordination efforts?
- FAO's role should be to continue to monitor the evolving situation and to keep the GRC and donor community informed of future developments. Cameroon: J. Dorman and M. Lang
 - FAO role, especially in Cameroon, in motivating and coordinating donors was very effective. Cameroon: S. Njymian
 - Coordination efforts should be the responsibility of the host government. Chad: USAID
 - The role of FAO cannot be underestimated despite minor criticisms from certain host countries. FAO should continue as the "go-between," between donors and host countries, in putting forward the problems and needs of each country to international donors and channeling as well as supervising the utilization of such donations as may be received. Chad: J. E. Ohabvike
 - Government of Chad should coordinate donors. Chad: V. Diefenthaler
 - FAO should continue to take the lead. FAO should continue to seek further external assistance to nations by coordinating the various donors. It should also assess and evaluate the needs and the campaign. ELCO/FAO in Rome as well as FAO office in Addis should continue coordination. Ethiopia: USAID/Addis Ababa
 - All respondents agree that FAO should play a major coordinating role in terms of locust information and forecasting, technical assistance and non-urgent procurement. Sudan: GH/L Program
 - Also, USAID should select a country or two to work with, where current donor support to CPS is minimal. The problem overlaps but extends beyond CILSS countries. CILSS is too limited. Guinea-Bissau: J. A. Franklin
 - Mission recommends that FAO and CILSS should improve performance in their mandated coordinating responsibilities. Mali: USAID/Bamako technicians
 - The FAO and the CILSS (ICDS) must continue this role of coordination by first improving their own coordination. Mali: S. Sountera
 - As described above, donors should continue efforts with emphasis toward institution building, and to this end, FAO and CILSS can assist by continued monitoring of the Sahelian situation and the impact of such a plan. Further, these organizations should work with other donors in monitoring pest populations and environmental conditions for potential future outbreaks. Mauritania: W. B. Thomas
 - FAO role per above. CILSS should act as an advocate for the member countries to ensure their pest problems are well documented, understood and have the attention of the donors. In this role, CILSS

would act as a complement to, rather than replace, the FAO. The advocate role for CILSS takes into account its lack of a rapid communications system and limited technical support capacity. Burkina Faso, Niger: C. Kelly

- FAO could be the convening body for donor meetings.
The Gambia: A. Laurence
- The same but improve on their roles. Niger: F. Boillargeon
- They should play a role of coordination and of channeling mobilized funds. Senegal: A. B. Ndiaye
- By strengthening of monitoring is an IPM program with careful "turn-key" contingency plans and TA support.
The Gambia: A. McKenzie
- FAO role was limited in Senegal in 1987. CILSS role should be at the broad policy level that affects relations between Sahel countries such as the agreement to transfer aircraft and pesticides from country to country. Senegal: E. Huddleston
- As participants in coordination efforts. Sudan, Mali: G. A. Schaefers
- Role of FAO and CILSS: support of the early warning systems through Agrhymet or PRIFAS. Chad, Niger: J. J. Drea
- FAO and CILSS--they remain principal actors that have much to contribute. Burkina Faso: W. H. Settle
- Insofar as there is always a ravager threat, this coordination is more than necessary. Contact and communication facilities of these organizations should be used to ensure this coordination.
Mauritania: Tahara Galledou
- FAO and CILSS can play a coordinating role in areas of: information, communication, diffusion and training. These may represent the basis for meetings at different levels. Chad: Ngaromillet Michel
- CILSS should play the role of regional coordination at the level of CILSS member states. This role of coordination, in order not to be a coordination by name, should express itself by the setting of a communication network between different countries and between countries and CILSS. CILSS should edit a brief bulletin of signaling diffused by telex to all member states and organism concerned. It is understood that this coordination will concern grasshoppers for which the interventions responsibility should be devoted to member states (Crop Protection Service).
- Coordination relative to desert locust will be imputed to renewed and new OCLALAV, which has the responsibility of control over this predator.
- FAO should continue to play its role of international coordination as well as for donor's coordination, funds mobilization and management

of multilateral assistance funds than for bulletin publication of period locust signaling. Burkina Faso: Gana Diagne

- The FAO and CILSS must continue to play a role in sensitization, coordination and information both at the regional (CILSS) and international levels.

4. Should an ideal model for coordination be developed?
- This is responsibility of host government with FAO as a reasonable alternative. Cameroon: J. Dorman and M. Lang
 - Yes. In each country by the national crop protection heads. Cameroon: S. Njymian
 - A coordination model is not needed. Because each country's situation is different, a generalized model would not be useful. Development of objectives, needs, and implementation plans can be done by the donor coordination committee. Chad: USAID
 - a. Yes. b. By FAO in view of its long experience in this issue and knowledge of the potentiality and capabilities of each host country. Chad: J. E. Ohabvike
 - A model for coordination is not needed. Use existing committees. Chad: V. Diefenthaler
 - Yes, if possible. Yes. By FAO HQ. Ethiopia: USAID/Addis Ababa
 - Two people didn't answer the questions. Symmons said "No - ideal models are a chimera." Other answers: a. Yes, by FAO; b. Yes, by steering committee; c. Yes, by all donors including FAO and GOS; Yes, reputable international agencies. Sudan: GH/L Program
 - No. A catalog of who is who and available services might be better and a lot cheaper at this time. Guinea-Bissau: J. A. Franklin
 - No, we recommend that all organizations make a concerted effort to perform their mandated roles. Mali: USAID/Bamako technicians
 - Yes, the FAO or the CILSS. The CILSS would be better suited for the sub-region. Mali: S. Sountera
 - Such a model, if possible to create at all, would have to be created by the donors and host country working together. This model would have to be flexible enough to stand up to the changing population levels of grasshoppers and locusts, as well as to the changing structure and role of the host country. Mauritania: W. B. Thomas
 - No. Conditions in each country are different. Theoretical objectives for coordination would be useful. Burkina Faso, Niger: C. Kelly
 - Yes. FAO and USAID, based on 1987 experience. The Gambia: A. Laurence
 - Yes, Niger. Niger: F. Boillargeon
 - The FAO and the principal funders. Senegal: A. B. Ndiaye

- It would be very useful by TA's sent out to the country. But how would it be implemented? The Gambia: A. McKenzie
- An ideal model for coordination should be developed. The host country should play a role in developing the model. A committee should be chosen at the next international donors meeting. If USG wants this to happen, USG will have to take the lead initially. Senegal: E. Huddleston
- The USG, if we want to maintain the leadership role. Niger, The Gambia: C. M. Voss
- Yes. Perhaps at the Donors conference at FAO/Rome. Sudan, Mali: G. A. Schaefers
- In the spirit of international cooperation, it seems as though a model of coordination should be developed. An ideal model should be based on successful programs that have an area-wide Mission oriented goal. This may involve the revitalization of existing institutions. It would seem that USG is in a good a position as any to spearhead this. Senegal: K. Seethaler
- Not clear to me. Chad, Niger: J. J. Drea
- An ideal model for coordination? Coordination is a process, not a model. We just need to pay attention to what works and what does not. Burkina Faso: W. H. Settle
- Ideas differ from one country to another. Therefore, the type of coordination to be used should be decided jointly in order to standardize data and results that may be needed. Mauritania: Tahara Galledou
- Yes. Perhaps FAO, but FAO should limit its interventions. Chand: Ngaromillet Michel
- I really doubt that there is an ideal model for coordination. Without autosatisfaction, we could recommend the model installed in Burkina. The creation of such a model of coordination shall stay the initiative of the government following the advice of one or several donors/FAO representation for example. Burkina Faso: Gana Diagne
- Creating an ideal model for coordination will be quite difficult, since coordination conditions differ in the countries concerned. For Burkina, for instance, the model found is appropriate and efficient, as already stated. Ouagadougou, Burkina Faso: Peter Dettmar

5. What did USG do in donor coordination that could be done differently?
- USG's role in donor coordination could no have been different given current staff levels. Cameroon: J. Dorman and M. Lang
 - Unusual delays in approving request from local USAID Directors. Cameroon: S. Njymian
 - USAID should have encouraged better coordination of implementation efforts. Chad: USAID
 - As far as coordination is concerned, the role of USAID is appreciable. Chad: J. E. Ohabvike
 - USAID reached the maximum point in efforts convincing government of Chad and others to take action. Chad: V. Diefenthaler
 - It did what it should have done and allowed FAO/MOA/OECD to coordinate, thereby taking a position as one donor, albeit large, amongst a group. Ethiopia: USAID/Addis Ababa
 - No relevant answers to this question. Mission feels that AID/W was tremendously responsive in assisting with donor coordination at the donor capital level. In Sudan, USG was represented on the steering committee and worked very closely with all major donors to coordinate program implementation. Donor coordination was one of the great strengths of the program. Sudan: USAID
 - Send administrative expert to Guinea-Bissau next time who can reduce 90-day administrative snarl we had this year. Guinea-Bissau: J. A. Franklin
 - Nothing. The 1987 campaign, in the Mission's view was coordinated at every level, i.e., multinational donor level, and in field activities. Mali: USAID/Bamako technicians
 - As with other donors, the USG decisionmaking offices in Washington attempt to obtain as much information as possible concerning the situation in a particular country. Decisions as to the amount of, and kinds of, monetary and material support given must reflect the severity of the pest situation. However, because insect populations rise and fall very quickly, this sort of decisionmaking means assistance often arrives too late. Mauritania: W. B. Thomas
 - AID benefits from donor coordination in Niger could have been improved by more regular contacts with other donors outside the regular coordination meetings. AID/W coordination with donors appeared to be good, although the eventual decline in reporting from AID/W and FODAG left the impression that coordination had ceased because external parties no longer thought there was a grasshopper or locust problem in Niger or other parts of West Africa. Burkina Faso, Niger: USAID/Burkina Faso: C. Kelly

- USG-USAID did basically most of local coordination. The Gambia: A. Laurence
- The results... Niger: CIDA: F. Boillargeon
- USG did all possible. Breakdowns come from GCTG at Gambian level. The Gambia: BHC: A. McKenzie
- AID/Dakar took the lead in donor coordination for the 1987 campaign and was successful in many ways including the development of the Action Plan and the Operations Center. While this taxed Mission resources, it resulted in a good campaign that considered USG interests and prevented many of the disagreements of 1986. Overall, the 1987 activities were a good use of resources and probably should be continued with more input from technicians from other donors. Senegal: E. Huddleston
- We may have moved too fast at times, without consulting our friends. This seemed to be better in 1987. Senegal, Mali, Burkina Faso: R. G. Adams
- The U.S. Government should study, along with other donors, the organization of this system in order to reach a concensus. Mauritania: Tahara Galledou
- The U.S. Government role is already appreciable within donor coordination in Burkina. A regular participation as the one observed by these two campaigns is the best way of assuming its coordination role. Decisions or recommendations being taken at unanimity, it is important that USAID/Burkina receive the necessary and immediate backup of AID Washington in order to improve this role in the coordination. Burkina Faso: Gana Diagne

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6. What did USG learn from other donors?
- Yes. Guess they learned what a locust control operation is because some did really know what it was all about. Cameroon: S. Njymian
 - From observation of other donor programs, we learned that donors should have had a vertically integrated program that did not rely on others' pledges. This year, other donor programs were not able to be carried out very effectively because one or more important components were missing. Some donors provided pesticides with no in-country transport, vehicles but no operating funds, and spray aircraft but limited pesticides. The USAID program was able to meet its objectives mostly because it was vertically integrated. Chad: USAID
 - That rapid action is essential during emergency operations. That conscientious opinion should be sought in final decisionmaking particularly as regards operations. Chad: J. E. Ohabvike
 - None of the respondents answered this question. The locust emergency program in Sudan has been a unique trial of donor coordination. From the beginning it has been a challenge to respect the various rules and regulations of all participating states, still keeping in mind the need for an emergency response to each situation. The EEC was found to be an appropriate partner for USAID in the emergency phase, with their ability to procure and ship inputs being invaluable to the success of the program. This procurement arrangement will probably be continued in the medium term. Sudan: USAID
 - They have their problems also. Guinea-Bissau: J. A. Franklin
 - Through donor coordination, we discovered common problems with spray application methods and materials, particularly identification and flagging of areas to be sprayed. A small-scale research effort mounted by TDRI was able to provide valuable infield support for emergency control programs. That ineffective other donor delivery systems thwarted operational and control programs. That most donors share common interests in the importance of safety and environmental concerns. Mali: USAID/Bamako technicians
 - It is the U.S. Government that can evaluate what it has learned from other donors. Mali: S. Sounera
 - The most obvious thing is that we're all working toward the same kind of goal, but doing it independently. Thus, if anything can be "learned" from one another, it would be to share information and resources, and coordinate our efforts. Mauritania: W. B. Thomas
 - Particularly in the case of Niger, AID learned that it needed to maintain close day-to-day contact with the crop protection service. This type of contact by the FAO, Germans, French and CIDA apparently made the provision of their assistance easier than was the case for AID. Burkina Faso, Niger: C. Kelly

- Except for the U.S., Canada, FAO and to some extent GTZ, the other donors simply provided funding. Active involvement appears to provide the greatest returns. Senegal: E. Huddleston
- To maintain a little more subdued profile. However, the Senegaliense "man in the street" really appreciated our help and knew about it because of our visibility! Senegal, Mali, Burkina Faso: R. G. Adams
- Provide to host country but should take into account the time of intervention. Chad: Ngaromillet Michel

1. Should USG continue to fund training in coming year and, if so, what training, for which target audiences, and at what levels?
 - Management training to include specific goals and objectives, writing job descriptions, accountability and scheduling as needed at the administrative level. At the agent and farmer levels, a systems model needs to be developed to optimize all available resources (CPS, other GOS agencies, NGO's and farmers) to assure rapid, economical transfer of essential information. Perhaps AID could fund a conference on training needs. Senegal: E. Huddleston
 - All the research, techniques and programs that are proposed to fight grasshopper/locust infestations rely in the end on human beings being available and trained to use them. If the person who does the work isn't trained, all resources are wasted. Various training programs were conducted by USG and other donors in 1987. The availability of these people who took the training to assist from 1988 and beyond should be checked. Niger, The Gambia: C. M. Voss
 - Yes, with the aim of having the host be able to cope with "normal" emergencies and, hence, calling for help only when needed. Senegal, Mali, Burkina Faso: R. G. Adams
 - Training should continue to receive support, particularly for middle level technical crop protection personnel. This could involve several weeks in IPM indoctrination or short-term (1 week) workshops. I would suggest Nairobi with visits to DLCO and the remote sensing facility for East Africa and/or those concerned with Desert Locust or African Migratory Locust. A workshop could be convened in Dakar for those interested in Oedaleus or other West African grasshopper species. The U.S. could lead a donor effort with strong inputs from FAO and PRIFAS. Sudan, Mali: G. A. Schaefers
 - Continued support of training activities in-country and in U.S. or other developed countries is essential to build strong Plant Pest Protection entities in African countries. The training should be directed at decision makers in the host country, but more importantly, it should be directed at the actual technicians who do the survey, evaluation, and control work. USG should lead a Donor Country effort to provide this training. Chad: P. W. Orr
 - Yes. I am not able to assess the efficacy of the training for the Control Program, yet it seems imperative that training take place at all levels of Host Country involvement. If it is assumed to be desirable to maximize the participation of Host Country Nationals, it would appear to follow that they be trained in the procedures. As I recommended in my Trip Report dated 20 April 1987, a very great waste could be averted by training Nationals in good warehousing techniques, especially with regards to pesticides. Broken bags of stored pesticides permit the escape of materials with potentially deleterious environmental and health effects. Besides that, it is wasteful. Stored equipment is always covered with brown silt and

usually is non-functional. CPS personnel might profitably be sent to the U.S. for training in small engine repair. Most of the ground spray equipment consists of small engines in disrepair that cannot be made functional because of a lack of spare parts and a shortage of personnel training to service them. Senegal: K. Seethaler

- Training is essential in Niger and especially in Chad. In Niger training at the village level to establish more "village brigades" could be the key to a successful operation. In Chad training at all levels is needed to bring the Crop Protection Service back to operational strength. Chad, Niger: J. J. Drea
- Yes--mainly on the job--aircraft calibration and other equipment calibration; pesticide safety and pesticide disposal practices; pesticide storage and other field related practices, for field oriented personnel. Senegal: G. E. Cavin
- Yes. Training in all aspects of IPM (detection, evaluation, suppression, consideration of alternative strategies) is critical to successful pest management. Suggest "IPM Principles" training be targeted at the decision makers so that they can make informed decisions. However, IPM training at the technician level is critical to insure that biological data is collected and analyzed soundly. Mali: L. Yarger
- YES!! The best development dollar spent is on training of host country nationals. All levels should be addressed, but clearly the number one priority is FIELD SCOUTS. I also think that long term training in Ecology and Pest Management would be worthwhile for a few good candidates from each country. BUT, if we send someone to a university for an M.S. or Ph.d, the research project should be done IN-COUNTRY. Burkina Faso: W. H. Settle
- I'm not fully aware of the training that AID conducted in 1986-87. In my opinion training must be all levels, from heads of crop protection services to farmers via extension agents. Training should be custom designed for the audience. Directors, assistant directors, and the like should receive training in organization, management, commodity procurement, etc. The best way to conduct this type of training is not in organized classrooms, but on a one to one basis in a working relationship with donor representatives. Training at lower levels is more easily carried out in more traditional forms. One to two week sessions during the dry season for all crop protection mid-level employees is essential. Topics should include lessons learned from the previous campaign, refinement of survey methods reporting of survey results, record keeping, proper use and maintenance of vehicles and spray equipment, etc. Extension agent training should be aimed at the role they are expected to play in crop protection, which will vary from country to country (farmer training or whatever). Senegal, Mauritania, The Gambia: B. Overholt
- USAID/CAMEROON believes that training is the best use of funds; training for farmers, extension agents and agricultural monitors and crop protection personnel, from the grassroots level to station head.

Cameroon: J. Dorman and M. Lang

- Yes, training of trainers, grassroots training. Cameroon: L. Soumare and A. Giner
- There seems to be other donor interest in providing in-country training for GOC extension agents in CHAD in 1988. AID should continue to use PRIFAS for training of upper-level crop protection staff focusing on biology of grasshopper and locust development, selection of pesticides and equipment, environmental issues, and management of crop protection office. Chad: USAID
- A. Yes. B. At the farmers' level to enable them to participate in protecting their crops by handling less complex equipment and less toxic pesticides, and to be able to send information on infestation in time to responsible authorities. C. At university level for senior officers of ministry of agriculture. Chad: J. E. Ohabvike
- Yes. Training should concentrate on practical control techniques and survey methods for extension agents. Chad: V. Diefenthaler
- Yes, training on survey methods and control techniques for field supervisor, field technicians and assistant agricultural offices at secondary level. Yes, on ground and aerial control of locusts, i.e., application methods. The trainees would be crop protection experts at diploma and degree level. Yes, training MOA zonal and district staff in planning/logistics, and farmers in application. Ethiopia: USAID/Addis Ababa
- The expatriate consultant agreed that most training should be on-the-job. Several of the Sudanese respondents asked that BSc, MSc, and PhD courses for entomologists, remote sensing specialists, toxicology, etc., be provided, in addition to practical training for mechanics, pilots, storekeepers, (handling and storage of insecticides) and various in-country seminars on crop protection, damage assessment technique, etc. Mission fully concurs with the necessity of funding on-the-job training. Mission notes that there are many PhDs in Sudan; what is needed are competent field managers who understand and can handle the constraints of working in the field. The creation of the Locust Control unit under the auspices of the medium term program will provide substantial training to field officers who will be selected for this special unit. Further training in storage management will be provided under the medium term program. Mission does support the idea of stateside training for a pesticide safety officer. Sudan: GH/L Program
- Yes. However, more management/administrative than technical skill deficiencies seem to exist. We need to address the organizational/management skills of those who organize, plan, control, and evaluate national emergency pest outbreak programs. Except, of course, for newcomers we may already have more technical training than we can currently use to advantage. It appears now to be more a problem of leadership, decision making and resource management. Guinea-Bissau: J. A. Franklin

--- Yes, the following courses and levels should be considered:

- a. Reinforcement of pesticide handling and safety for agents and farmers;
 - b. Ground support of aerial operations for selected teams of CPS personnel;
 - c. Management training and inventory control for middle level managers;
 - d. Data processing training for clerical staff and middle level managers;
 - e. Radio operations and installation;
 - f. In the case of Mali, pilot training in agricultural applications;
 - g. Support training grants for selected agents to the PRIFAS course.
- Mali: USAID/Bamako Technicians

--- Yes, by all means. Trainees should come from agricultural schools, agricultural research centers, crop protection services, and field workers. This is perhaps the most important assistance project possible for the long range support of grasshopper/locust management. Such training can include regional seminars on specific control procedures, as happened last year in Niamey and Dakar. Also training with PRIFAS and degree training at universities. Note that one of the biggest problems now is not so much expertise as organization. Mauritania: W. B. Thomas

--- For Burkina the Crop Protection Services has expressed an interest in additional assistance to train more field agents in grasshopper survey skills and more detailed training for senior field personnel in grasshopper control operations. The Crop Protection Services could also benefit from specialized training in radio operations and maintenance, emergency operations management and aircraft contract administration (planning, specifications compliance and evaluation). For Niger, training is needed on survey methods (field personnel), aerial application (upper management and field levels) and communications (all levels). All of this training can be done in-country through the use of short and long term technical assistance. Burkina Faso, Niger: C. Kelly

--- Yes. Village extension workers: Survey techniques; pest identification; pesticide application using backpack equipment; safety regulations; first aid.

- CPS regional teams: As above plus: storage of pesticides; pesticide application vehicle mounted equipment; equipment maintenance and repairs; environmental assessments, station management; radio operations.
- Command Center: Campaign management; reporting; aerial application, taxonomy/identification major pests. The Gambia: A. Laurence

--- Yes. Training for trainers in all areas of Crop Protection Service. These training sessions can involve supervisory staff and farmers. Senegal: A. B. Ndiaye

- Village team training is not yet completed. It should continue. It is absolutely necessary. Refresher courses for the CP staff takes place on a regular basis. It is a support activity which produces results.
- I do not think there is anything to improve in this area. The training provided to the CP staff during training sessions deals with predators in general, particularly grasshoppers. It would, perhaps, be necessary to further emphasize the use of different treatment equipment such as the A.7000 sprayer, exhaust sprayer, and MICRONAIR's review of results. Niger: M. Germaux
- Training is the basis of any action in the campaign against crop ravagers. Therefore, this training should be directed at both farmers and staff. Mauritania: Tahara Galledou
- Training in the areas of grasshopper/locust biology, materials, equipment and pesticide manipulations, organization of aerial treatments, environment protection, crop loss estimation and organization of village brigades to control grasshopper. Training should be at all levels but should emphasize plant protection agency and agricultural extension agents. Chad: Ngaromillet Michel
- The good efficiency of a Crop Protection Service lies on agents training at all levels: peasants, encadreurs, prospectors, responsible of control units, central responsible. We think that the U.S. Government should continue to finance two series of training: in-country peasant training by the organization of local sessions, high level officials training engineers, acridologists and technicians in telecommunication for the installation and the maintenance of walkie talkies. Needs in high level officials training can be early evaluated with Crop Protection Service. Burkina Faso: Gana Diagne
- Despite efforts made by the Burkina Government and certain donors (including West Germany) much remains to be done in the domains of training and/or re-training, for which a commitment on the part of the U.S. Government would be much appreciated. Ouagadougou, Burkina Faso: Peter Dettmar
- Practical training in all aspects of applied PPM is required to maintain local crop protection staff ready to and capable of responding effectively to future pest outbreaks. Additional remedial training will continue to be necessary as pest situations and control strategies change. The USG through AID and contractors should continue to provide this training to assure that pest control is done safely and efficiently.
- While it is necessary that lower level crop protection staff and the farmers who actually "do the work" receive information on proper techniques, it is usually not feasible for outside trainers to reach them directly. Train-the-trainer courses for specialists and extension workers must assure that trainee/trainers are equipped with appropriate knowledge, teaching skills, and instruction materials to

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effectively relay information to field workers. For example, it is inappropriate to teach the use of sophisticated pesticide application equipment and protective clothing in areas where these materials are not available or too expensive. The same can be said for the kinds of teaching aids use. There are, however, often locally appropriate alternatives. Knowing what the alternatives are in a particular region may require a pre-course survey.

- Train-the-trainer courses should be followed by period spot checks of local training programs and actual pest control operations to help assure their effectiveness. Spot checks and surveys will help identify areas needing improvement. Oregon State University: Alan Cooper

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2. How can training best be coordinated with other donors?
- Donor representatives should be invited to the training conference which should be held in early January. A coordinated schedule could be developed. Senegal: E. Huddleston
 - Training should be coordinated by consultation with other donors. Niger, The Gambia: C. M. Voss
 - Probably by establishing a "Board" or clearinghouse of some kind. Senegal, Mali, Burkina Faso: R. G. Adams
 - Training coordinated with other donors. Possibly through the use of manuals and training aids. Also visiting instructors from other donors. Chad, Niger: J. J. Drea
 - Multidonor and in-country task force approach so that "agreed upon" formats and emphasis areas can be developed. Mali: L. Yarger
 - This can be best accomplished by taking into consideration institutions in European countries as well as in the US. For instance, the best research on grasshoppers in Africa was done by the British. I would like to make a very strong appeal for considering Morocco as a source of trainers and a locale for training. In my opinion, Morocco has the best anti-locust and grasshopper research and control operations on-going in Africa today. Burkina Faso: W. H. Settle
 - As there are few U.S. entomologists with the language capabilities necessary to be effective trainers, possibly the U.S. could finance training conducted by others donors. Certainly meetings should be held in each country to insure that more than one donor isn't planning to implement the same type of training. Senegal, Mauritania, The Gambia: B. Overholt
 - Donors will offer the training they are able to provide. The best coordinating source is FAO. Cameroon: J. Dorman and M. Lang
 - Through meetings. Cameroon: L. Soumare and A. Giner
 - For Chad, in-country training by other donors has been well coordinated through the donor coordination committee and done early in the season. Chad: USAID
 - USG should investigate funding a long term group training with other donors, by developing common understanding. Ethiopia: USAID/Addis Ababa
 - Three people didn't answer. Three thought training should be coordinated by the steering committee, one thought the FAO should coordinate training, and two thought each donor should handle a specific area of training. Mission agrees that training programs could be coordinated through the steering committee, as they were done this year. There were three (3) training programs for PD field

staff this year. Each program schedule was reviewed by the steering committee for comment and the trainers of each session informed of the content of previous training. Sudan: GH/L Program

- Through country teams and a special Ad Hoc training committee under AGPP (Brader) with decisions based on in-place job skills analysis, also the construction of model grasshopper control operation, job skills inventory and established performance standards. This should be prepared by someone trained and practiced in CPS organizational development, job skills/problem analysis, plant protection and plant protection training program development. Guinea-Bissau: J. A. Franklin
- It is the responsibility of the National Services to evaluate the need for training and to ensure coordination among the donor countries.
Mali: S. Sountera
- Coordination as with other monetary and material donations, with those countries able to offer the training leading the effort.
Mauritania: W. B. Thomas
- By donor meetings. The Gambia: A. Laurence
- Leave it as it is: Less interference is better. Niger: F. Boillargeon
- By the FAO. Senegal: A. B. Ndiaye
- A technical committee for training should be established in each county to assure training provided by different donors is complementary and coordinated. Burkina Faso, Niger: C. Kelly
- Training and the target of the training vary. The approach, training, and trainers themselves are all parameters that must be taken into consideration. And according to the organizational level in the control campaign, the various techniques used to execute it and its follow-up are important. Therefore, training must be organized. Mauritania: Tahara Galledou
- Training will require better coordination between donor and host country to decide subjects of training. It is important to designate a coordinator with an implementation and monitoring role. Chad: Ngaromillet Michel
- In order to avoid duplication, a coordination meeting on training needs in locust control may be held. Burkina Faso: Gana Diagne
- It is, first of all, the responsibility of the Government of Burkina to coordinate donor efforts well in this respect; additionally, a meeting of all donors to deal solely with this question (needs, demand, who can or wants to finance what type of training, etc.) could be considered. Ouagadougou, Burkina Faso: Peter Dettmar

--- A more coordinated training program is necessary on all fronts. An international training coordinating committee including private as well as government representation might decide which organizations will be responsible for training. The designated organizations must then carefully plan training content and delivery. DOing this on a regional rather than country basis may create efficiencies and minimize duplicated efforts. Including industry in the planning phase can make additional human, material, and financial resources available. Oregon State University: Alan Cooper

3. What role should the Crop Protection Service play in future training programs?
- Senegal CPS should be the coordinator for training because of the Dakar Training Center and the experience of the staff. Outside assistance and new ideas are needed. Senegal: E. Huddleston
 - Crop protection services should play the lead role in each country and determine the manpower needs and provide their own training to the extent necessary. Niger, The Gambia: C. M. Voss
 - Selection of candidates. Senegal, Mali, Burkina Faso: R. G. Adams
 - The Crop Protection Service should play the leading role in training programs. They should determine what training needs to be done and the target audiences. It is of course implied that the Donors that do the training would be consulted closely on this so that training can conform to their capabilities and to the extent to which they wish to become involved. When training is done in-country, CPS would determine the times and locations and provide salaries and per diem. Senegal: K. Seethaler
 - Role of Crop Protection Service in future training programs: Increase activities of their training sections. Institute a train-the-trainers program where necessary and maintain the level of competence of the instructors. Chad, Niger: J. J. Drea
 - Initial training should be aimed at training the trainers so that Crop Protection Services will carry out future training as needed, with periodic updates provided to the trainers by a multidonor task force. Mali: L. Yarger
 - Do you mean APHIS? They should take the lead. Mali: S. Tunnock
 - Ideally, they should be the impetus leading to the training programs. Most often, a particular training program idea will be suggested to the crop protection service. If they feel it is worthwhile, then they should participate by sending out invitations, providing internal transportation and lodging if possible, and participating during the training session. Senegal, Mauritania, The Gambia: B. Overholt
 - Once a cadre of trained personnel has been established at the Crop Protection Service, in-country training given by CPS to its employees and Ag school students. In the mean time, the CPS should support efforts by donors to establish a contingency of trained personnel within their organization.
 - Crop protection service must make manpower available for training, replicate and multiply training, as well as provide materials for training, if available. Request to FAO. However, Mission believes the most effective training is grassroot training in situ. Cameroon: J. Dorman and M. Lang

- Identify the people to be trained and participate in training course. Cameroon: S. Njymian
- In Chad, upper-level crop protection agents need more training before they can train subordinates. Chad: USAID
- Ensuring that only the best and most conscientious of its staff are sent for higher training for posts of responsibility. Ensuring that its trainer staff fulfill the task of training the peasants at village levels. Chad: J. E. Ohavike
- Crop protection service personnel should be the key participants in a training program. Once they are trained, extension agents should train farmer. Chad: V. Diefenthaler
- Crop protection should be requested to submit their future requirements and contribute in-kind, e.g. facilities, equipment. Crop protection requires training to assess needs, intervention, etc. This is an important element. Ethiopia: USAID/Addis Ababa
- Most of the Sudanese respondents perceived the PPD's future role in training as one of identifying appropriate courses of study, choosing worthy participants and organizing the training programs. PPD can also contribute lecturers and trainers for in-country courses. One man suggested PPD organize a monthly seminar as was done between 1973-1978. No useful comments were made by the expatriate consultants. Mission strongly believes that the PPD has the capability to provide trainers for courses. PPD should also assist in identifying candidates and can assist in setting up the program, as they did this year during the CEO training. Sudan: GH/L Program
- Selection, design and conduct of in-country training programs for participants below senior staff level. Materials and technical assistance to be available from external group like "small IITA" and assigned national researcher. Also CPS participation in agricultural school curriculum should be considered. Guinea-Bissau: J. A. Franklin
- Local CPS should develop basic training plan estimate necessary resources required to carry out adopted plan. We see the CPS taking the major role in farmer training. Mali: USAID/Bamako Technicians
- Once a cadre of trained personnel has been established at the Crop Protection Service, in-country training given by CPS to its employees and Ag school students. In the mean time, the CPS should support efforts by donors to establish a contingency of trained personnel within their organization. Mauritania: W. B. Thomas
- CPS should provide staff to be trained and trainers (as far as available). The Gambia: A. Laurence
- Having priority. Niger: F. Boillargeon
- Provide receptive personnel. Senegal: A. B. Ndiaye

- Programs should be organized with CPS input and with view to CPS doing their own courses, i.e., by TA training of trainers.
The Gambia: A. McKenzie
- They should be the recipient and coordinator of the training efforts.
Burkina Faso, Niger: C. Kelly
- The Crop Protection Service should provide both training and follow-up for trainees, in order to better profit from the outlay provided. Mauritania: Tahara Galledou
- His role will be to identify needs in the area of training and to define the program in collaboration with donors. We will participate in the training activity. These training services should be training needs for agricultural extension agents. Chad: Ngaromillet Michel
- Crop Protection Service must ensure the responsibility of the organization and of the training session march executed locally; peasants training, prospectors training, units control chiefs training, even if the participation of international consulting experts is necessary. Burkina Faso: Gana Diagne
- The Crop Protection Service must be the principal body responsible for all local training pertaining to preparation, development and evaluation. Ouagadougou, Burkina Faso: Peter Dettmar
- Trained crop protection staff, assisted by extension staff, should carry out field-level and farmer training. Their training programs should be reviewed by international experts. Oregon State University: Alan Cooper

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4. Should the U.S. lead a donor effort in FAO to provide for training of Min. of Agriculture officials in locust control measures? Should we offer a training program here (under FAO auspices), for CPS staff?
- Training probably should be quite specific in contrast to the general type of training given by PRIFAS in May 1987. A concentrated, practical course in aerial and ground pesticide application technology is needed to improve the efficiency and reduce the costs of pest control in the Sahel. New Mexico State University has expressed an interest in coordinating a training session of this nature. Senegal: E. Huddleston
- It would be convenient and less expensive for the US under FAO to offer training and update information here for CPS staff. Another alternative would be to see if England, through their Cranfield training facility, may wish to do this with some US support. This should be a course targeted specifically at grasshopper/locust control subjects. They have been actively training international participants in their annual agricultural aircraft technology course and have instructors experience in locust control procedures. Niger, The Gambia: C. M. Voss
- Yes! Yes! Both would contribute to U.S. long-term goals. Senegal, Mali, Burkina Faso: R. G. Adams
- This seems a very good idea as suggested elsewhere in the answers to this questionnaire. By sending CPS observers to our own grasshopper control operations and by formal training of CPS personnel in control operations procedures and in the various logistical aspects of control such as equipment maintenance, communication, storage and distribution of supplies and material, we should be able to make a significant long-term contribution to the development of cooperative control efforts. Providing logistical advisors in-country who are charged with cooperating with the CPS in the integration and enhancement of networks of logistical support would, if it meet with any success at all, be providing valuable assistance in a very needed area. Senegal: K. Seethaler
- USG role in training with FAO. USG should either lead or be part of a training program for local government officials otherwise the local program will remain weak and dependent on donors to function. Training is the major element other than actual locust control operations in times of outbreaks. Location of training program - If held in U.S. there is a language problem, costs of transportation, etc., and lack of local conditions. Other than university education, training should remain an in-country activity except for those who have advanced beyond the level of local training and are in a position of responsibility and could benefit the service by advanced training. This could be elsewhere in Africa, Europe, or the U.S. Chad, Niger: J. J. Drea
- Through development of contracts that specifically spell out what is to be accomplished and how. Contract administration would be a key component of any package to procure full services. USG contract

administrators would need to be knowledgeable in IPM and environmental safeguards. This could be accomplished through TDY detailing of USG technical experts. Mali: L. Yarger

- Yes and Yes. Mali: S. Tunnock
- Sounds like a great idea, but wouldn't it be better to do the training in the Sahel? Otherwise it turns into a holiday boondoggle. Senegal, Mauritania, The Gambia: B. Overholt
- Training of the trainers is to be given abroad and that of the extension agents in the host country. Cameroon: L. Soumare and A. Giner
- AID should contract directly with PRIFAS for special training in locust control. Chad: USAID
- It should be a bilateral program coordinated through the donor committee. The program should not go through FAO. Chad: V. Diefenthaler
- Two failed to answer the question while five answered affirmatively but without elaboration. One thought it would be better if training is done locally for field officers under the auspices of FAO. For special training, for example, in meteorology and maintenance of equipment, training abroad may be recommended. A FAO consultant stated that as the US doesn't have locusts it would be more sensible to train people in Australia, which has both locusts and an effective survey and control organization, for two to four months. The other FAO consultants agreed with this point and added that visits to functioning organizations overseas should be sponsored as well. Mission is of the opinion that stateside training in the area of locusts may not be useful for reason given above. However, training in pesticide management and safety would be very appropriate, and is much needed. Training of Ministry of Ag officials in the area of locust control will be part of the creation of the locust control unit under the medium term program. Sudan: GH/L Program
- Yes, But not just "Locust." Make it more encompassing: "The design, implementation, control and evaluation of national pest control programs." We suggested this before and are prepared to suggest possible content/objectives. There are enough English speakers involved at high enough levels in the various Francophone countries to make it worth while. Probably can also be done in French in U.S. Guinea-Bissau: J. A. Franklin
- For Mali, Mission believes that Malian CPS has a cadre of well trained locust scouts from OICMA. If a training program is envisioned, Mission recommends that it be developed in collaboration with other donors particularly PRIFAS. Mali: USAID/Bamako Technicians
- Yes. In the U.S., or where ever such training can be best set up. Mauritania: W. B. Thomas

- Who should offer the training program should be decided in donor meetings and based on what is needed and where specific courses or experts are available. The Gambia: A. Laurence
- Not necessary, they have already had good training. Locust control is not expected to be a problem in Burkina. If it were to be a problem control efforts would be similar to grasshopper control operations. Locust control in Niger is part and parcel of normal pest control operations. AID should include preparedness for this problem as part of its overall emergency and long term assistance to the GON for pest control. We should encourage FAO training in country on survey and control procedures (in coordination with OCLALAV) and externally for key field managers and decision makers. Burkina Faso, Niger: C. Kelly
- Yes, and they can offer a program based on host country's needs. This will prevent multiple interventions in the area of training. Chad: Ngaromillet Michel
- Training is a very important element in the locust control effort. Control involves knowing the ravagers, using the appropriate products and equipment, and setting up some form of organization for the optimal execution of the program. For all these reasons, the U.S. Government should lead a donor effort to offer extension agents and farmers the training that is both necessary and indispensable. This training should take into account the specific needs of each State. Ouagadougou, Burkina Faso: Peter Dettmar
- Yes, the U.S. is well equipped to take the lead in an international training effort, but other organizations (as indicated in item 2) should invited to play a role in course design, material preparation, or actual instruction. Training is probably best done in-country. A train-the-trainer course should emphasize locally-relevant examples and demonstrations, and include information on training methodology utilizing available resources. It is difficult to simulate these things outside of the target area. The use of pest management expertise from international centers located in the region may also be precluded. Oregon State University: Alan Cooper

XV. PRIVATE SECTOR INVOLVEMENT

1. How can private sector best be tasked to furnish a total procurement package (item being procured, technical assistance, training, special requirements)?
 - If pesticides were to be ordered through private sector in Cameroon, it could become a condition of sale that they provide a certain amount of field-level training in spraying. As long as donors are providing pesticides, however, there appears no scope for the private sector to develop a total procurement package. Cameroon: J. Dorman and M. Lang
 - Through exploratory discussions. Cameroon: L. Soumare and A. Giner
 - By fixing a time limit for effective implementation of tasks, the failure of which the [private] sector could be penalized by withholding of a certain percentage of cost value. Chad: J. E. Ohabvike
 - The private sector can easily be contracted to carry out full services. Chad: V. Diefenthaler
 - Two Sudanese respondents thought the private sector could be encouraged to provide equipment and spare parts but should go through the USG and GOS. All non-TA assistance from USAID/EEC donations to the emergency were contracted out to LUXCONSULT, a procurement company in Luxembourg. Our experience with LUXCONSULT was excellent and it is recommended as the best mechanism for the medium-term program. TA is appropriately contracted through FAO and aerial spraying through private companies. Sudan: GH/L Program
 - In-country, there is hardly a private sector. Outside (USA), I really doubt private sector can do this job. Too large a job. Private sector expertise is usually limited to public sector retirees who are often capable, but have no interest in a full-time commitment, and now no public agency back-stopping. These programs are large and complicated. Only large public service action agencies have the up-to-date skills, continuity, knowledge, personnel, facilities, and contacts to properly coordinate and conduct such a program. These programs are "routine" in the public sector. There also isn't the overriding profit motive that suddenly turns amateurs into experts thinking they can do something they may have observed but haven't ever done before. Guinea-Bissau: J. A. Franklin
 - Our experience demonstrated that the private sector was effective in total package procurement of pesticides and spray equipment. We maintain our earlier recommendation that specifications be respected in contracts for aircraft spray equipment. Mission had no experience with technical assistance, training, and special requirements from private sector sources. We are eager to learn of other Missions' experiences in these areas. Mali: S. Sountera

- The expertise and cost effectiveness of Washington, DC area-based consulting firms is questionable. The four regional consortia of Title XII Universities and their experience with pest control, training, technical assistance, and the pesticide manufacturers offer a good possibility for a total procurement package. Senegal: E. Huddleston
- On any private sector sales of items such as truck spraying equipment of some complexity, they should be required to supply the technical assistance and training to operate. Niger, The Gambia: C. M. Voss
- Beware of the "Beltway Bandits" and buying back public information and expertise!!! Using A-76 guidelines, if the use of "private sector" contractors is economically viable and their production "milestones" closely monitored, then contracting out may be very helpful. Contracts for a "total procurement package" will have to be carefully written and reviewed. Senegal, Mali, Burkina Faso: R. G. Adams
- With sufficient guarantees, private companies could provide a total procurement package. However, USG or FAO experts should provide training for in-country personnel and obtaining the various permits and clearances needed for aircraft. Chad: P. W. Orr
- A prospectus should be prepared that precisely defines all the parameters required in the procurement package, including a tentative budget. The private sector would be invited to bid on the package. The bids would then be judged with awards given to the bidder with the most credible package, provided that it meets all minimum standards. Senegal: K. Seethaler
- Suggest this be discussed in detail with representatives of the U.S. Pesticide Industry through the National Agricultural Chemical Association of some other similar organization. Chad, Niger: J. J. Drea
- Yes. Mali: L. Yarger
- Chemical companies have a lot to offer if they think they can sell their product. Mali: S. Tunnock
- I don't know. Senegal, Mauritania, The Gambia: B. Overholt
- Total procurement packages are better furnished by coordinated donor efforts, with the private sector working with other donors to achieve goals decided upon with the host country. Mauritania: W. B. Thomas
- Buying a "package deal" from a commercial supplier either requires a supplier well versed in the problems and procedures of working in the Sahel or providing direct support to uninitiated suppliers to get them going. There are few of the first case and the second is little different from what is done at present. Using the opportunity of critical pest problems to open up markets for new suppliers should not take precedence over the requirements of providing an emergency

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response to the problem. It appears commercial competition for the provision of pesticides through the use of bilateral funding is very strong. We can also play this game, but it will be expensive and reduce the effectiveness of our overall assistance. At the same time, non-traditional suppliers may be able to provide better products. We should ensure that markets are not closed to reasonable and rational competition to provide the best product, and related support and training, at the best price (assuming significant time is available for forward planning and the rational exercise of normal commercial practices). Burkina Faso, Niger: C. Kelly

--- Through invitation. Sudan, Mali: G. A. Schaefers

--- Skeptical of privatization due to safety and efficiency aspects of pesticide application. Chad: P. W. Orr

--- It must be noted that the Ciprochemie Company, which manufactures our insecticides, is part of the ARIDIS group. When necessary, it can arrange for the supply of the total procurement package (treatment products and equipment, transportation equipment, and maintenance). Ouagadougou, Burkina Faso: Peter Dettmar

--- By quickly supplying products and equipment that they manufacture. Mauritania: Tahara Galledou

--- (i) Any economic operator concerned with crop protection must have trained personnel and technicians able to answer to the different problems which users will evoke (peasants, state agents, etc...) otherwise it represents a danger. So, here again, an agent training before the authorization to trade is necessary.

(ii) As soon as the locust phenomenon appeared in 1985-86, we saw a great number of societies proliferate and offer their services either for treatment (plans and helicopters) or buy products.

Now it would be necessary to update a catalog of different societies as well as the services rendered. Burkina Faso: Gana Diagne.

XVI. TECHNICAL ASSISTANCE

1. Was technical assistance adequate in 86-87?

- Technical assistance could have been much more coordinated within the donor community. It was often the case that technical assistance personnel worked on the same problem with out knowledge of the other's existence. This was partly brought about by the CPS, apparently preferring several donors doing the same thing, rather than chance the possibility of losing support. Mauritania: W. B. Thomas
- The quality of technical assistance (in Burkina and Niger) appeared to be good. Timing of assistance could have been better. Burkina Faso, Niger: C. Kelly
- The number of TA's was sufficient but their timing not appropriate. Especially in preparative stage of the campaign a logistician - pesticide expert was desperately needed. The Gambia: A. Laurence
- In my opinion, this assistance was fully adequate, although it is disputable whether it was shown so in the field. It is in the field, though, where it is the most efficient and useful. Niger: M. Germaux
- Technical Assistance in Senegal in 1986-87 was adequate. Senegal: E. Huddleston
- From my observations and checking the reports, it appears that technical assistance was adequate in 86-87. Niger, The Gambia: C. M. Voss
- I think so. Senegal, Mali, Burkina Faso: R. G. Adams
- In my opinion, the 1986 technical assistance in Chad was sufficient. Sudan, Mali: B. A. Schaefers
- I was not in a position to observe this throughout the operations. What I was able to observe was that a great deal of valuable technical assistance was provided with at least some degree of success. It did seem that there was room for improvement in at least one area, that of planning. In order to maximize the benefits of the planning, it would have helped to begin earlier and sustain it over a longer period. I cannot help but feel that some inefficiencies of operation and added costs of procurement must have occurred that could have been averted through more extensive planning. Senegal: K. Seethaler
- Adequacy. It was adequate but delayed. Chad, Niger: J. J. Drea
- We provided the only technical assistance I could see in Mali during 1986. Mali: S. Tunnock
- Pending the forthcoming evaluation, Mission feels that technical assistance was adequate. Although we would have preferred a much

earlier arrival, say April, to ensure training and a longer stay to complete studies for next season's prospects. Cameroon: J. Dorman and M. Lannig

- No. Cameroon: S. Njymian
- Yes, technical assistance was adequate in 1986-87. Chad: USAID
- Yes and this was perfect in Chad. Chad: J. E. Ohabvike
- Yes, technical assistance was adequate in 1986-87. Chad: V. Diefenthaler
- It was fairly adequate for insecticides and application equipment (sprayers) but not in other inputs, which were equally vital. Yes. Ethiopia: USAID
- In general, TA was considered to be adequate. One respondent said that TA was adequate and that program constraints did not result from donors. Another said TA was more than adequate and that some consultants were underutilized, not through their own fault, but due to organizational difficulties at PPD. He said quite a number of experts found themselves doing things outside their own terms of reference. One of the FAO consultants said TA was inadequate and should have started earlier in March, not late June/July. Several respondents used this question as an opportunity to cite what physical inputs were needed for the program, listing (a) ULV chemicals, (b) vehicles, (c) heavy trucks, (d) protective clothing, (e) 10 radio sets HF SSN, (f) 15 radio sets UHF, (g) survey camping, and protective clothing. Mission believes that there was more than enough technical assistance in 1987: team leader, spraying expert, equipment expert, two survey experts, a grasshopper expert, and an environmental assessment expert. As concerns the team leader, in particular, substantial delays were incurred in his arrival due to problems beyond the control of FAO/Rome. When team leader McCulloch left in September, spraying expert Gorta took over his position, thereby becoming more of an administrator by definition than a technician. In this respect, consultants went beyond their official terms of reference to carry out the job. Sudan: GH/L Program
- No--all technical consultants assigned to the 1987 field operations program in Guinea-Bissau had limitations. Guinea-Bissau: J. A. Franklin
- Our USG procured technical assistance performed extremely well. We did note other cases where the level of technical assistance was variable. There is a high correlation of TA effectiveness between quality of work, the amount of time spent with the CPS and in the field. Mali: USAID/Bamako technicians
- Technical assistance has been sufficient. Mali: S. Sountera
- Yes. Mauritania: Tahara Galledou

- Insufficient during the 1986-87 season. Chad: Ngaromillet Michel
- (i) Yes. This technical assistance has been sufficient and for 1985-86 and 1986-87. However, it has been better coordinated during this 1986-87 campaign.
- (ii) It would be good, as we've already seen the case for the 1985-86 campaign, to avoid the excessive number of experts visits who come for too short a time (2 to 3 days) and who, in fact, disturb you more than they can help you. Such visits oblige everyone to look after them, to give them information on the locust situation, etc... Meanwhile, in return, we do not receive anything (not even a Mission report).
- Missions would only be programmed only in function of governments needs. Burkina Faso: Gana Diagne
- On the whole, yes. Ouagadougou, Burkina Faso: Peter Dettmar

2. What are the anticipated needs for technical assistance in 1988?

--- Along with working with the CPS in order to prepare for and implement control operations, assistance could be added to research the grasshopper locust problem more thoroughly. Continued assistance should be supplied for general survey and control aspects however.
Mauritania: W. B. Thomas

--- For Burkina it is too early to tell. The GON is preparing a summary of the 1987 campaign and will be developing an "Action Plan" for 1988 in early December, 1987.

Niger: Program Coordinator for 11 months; Project Assistant for 9 months; Entomologist to provide training and operations oversight for 6 months; Aerial Operations specialist for 4 months of training and oversight; Communications specialist for 2 months of training and materials development. Burkina Faso, Niger: C. Kelly

--- TA's for planning, logistics and training before onset of cropping season. TA's for pesticide application, maintenance, insect identification and surveying during cropping season. TA for pre-storage activities and storage of equipment and pesticides at end of cropping season. The Gambia: A. Laurence

--- Technical assistance needs in 1988 should be reduced. Training (1 month) is needed in computers. Assistance would be helpful in preparing 1988 Action Plan (2-3 TDY for 1 month). TDY assistance in ground application for 1988 has priority (3 months). Other assistance will be needed if an outbreak occurs. Senegal: E. Huddleston

--- There should be much carry-over into 1988 of technical assistance from previous years. Any needs will show up in the end-of-year reports.

--- Planning and training. Senegal, Mali, Burkina Faso: R. G. Adams

--- Training of Ministry of Agriculture personnel is a continuing need. Chad: P. W. Orr

--- With the experience of 2 years in the current cycle of infestation behind us, it may be that the scope of assistance should be assuming some degree of higher resolution. Assuming that there remains a potential for further infestation next year, there will surely remain a need for continued technical assistance. Assessment of past activities, refinement of the planning process, improved logistics, and attempts at integration of objectives on a regional basis would seem to be areas where assistance could be profitably directed.
Senegal: K. Seethaler

--- Needs for 1988 - Establish training at all levels in Chad and at village level in Niger. The physical needs will require a preliminary inventory of existing and functioning equipment and supplies. In

Niger an increase in the number of usable airstrips in the various regions to avoid long and time consuming flights to infested areas. Chad, Niger: J. J. Drea

- Depending again on findings of evaluation, anticipated needs for '88 campaign will be most likely one. Grasshopper/locust expert to continue training and perhaps one logistician, preferably with aerial spraying background. Cameroon: J. Dorman and M. Lannig
- Trainer, logistician, locust control expert, crop loss assessment. Cameroon: S. Njymian
- Technical assistance in entomology and logistics will be needed as early as March 1988 to help GOC develop season's general operation plan and later to assist in the implementation of that plan. Chad: USAID
- Entomologists, communication specialists, and logisticians will be needed in 1988. Chad: J. E. Ohabvike
- The maintenance of technical personnel as for 1987. To ensure immediate takeoff in operations, i.e., egg pods research and evaluations to start by early December 1987 before the soils get too dry and sites of observed heavy infestations forgotten. Chad: V.Diefenthaler
- Anticipated needs for technical assistance in 1988: vehicles for ground survey and control teams, motor driver sprayers, communication radios, good coordination between Sudan, Ethiopia and Somalia with regard to information and surveillance. Ethiopia: USAID
- Three people said this issue is being dealt with by the medium-term project. Three others provided long lists of materials and equipments needed which included the following: insecticide, vehicles, radios, camping equipment, protective clothing, spraying equipment (wheelbarrows, motorized and pneumatic knapsacks and dusters), trainers, money for hiring aircraft, etc. Another respondent said an experienced chief technical advisor is needed to help a national project director and two experienced subject matter specialists; one on survey and campaign organization and another on forecast and information. A part time typist would be useful too. Sudan: GH/L Program
- (A) One person (the same person) is needed by CPS (Government of Guinea-Bissau).
 - 1) November - January egg pod survey (1987-83, 88-83).
 - 2) April to May - provide training in nymph survey to CPS villages (1988).
 - 3) June - Assist CPS survey for nymphs to verify/correlate egg pod predictions (1983).(B) Control - one person to assist in organizing national field operations program 15 July to 30 November (1988-89).

(C) Logistics - one person to assist in supply acquisition, distribution, storage, inventory, transport, etc., April to 30 October (1988-89).

As seen above, no extensive technical assistance is anticipated as needed after 1989 except in emergencies. Guinea-Bissau: J. A. Franklin

- Other than for the training needs previously identified, it is too early to establish total TA requirements for 1988. Mali: USAID/Bamako technicians
- Needs for 1988 will be established at the end of the 1987 campaign. Mali: S. Sountera
- Egg-pod surveys, coordination, logistical positioning, land and aerial operation, construction of storage facilities, technical assistance, and miscellaneous supplies. Mauritania: Tahara Galledou
- One acridologue entomologist, 1 logistician, 1 expert in crop loss assessment, 1 trainer. Chad: Ngaromillet Michel
- Real needs for 1988 campaign will be determined after the present campaign evaluation. However, we think that the following minimum technical assistance will be necessary: (i) a qualified acridologist for prospectors refresher course or training and (ii) a logistician for control campaign by plane. Burkina Faso: Gana Diagne
- There is a need for more care in selecting pesticide application equipment, especially that used for ground application. Much of the equipment available is not well suited for use in these areas or for the pesticides being applied. As a result, it is in disrepair and/or being used improperly.

The same can be said for protective equipment and clothing. In the few places where it is available at all, it is not well maintained and often of a design not appropriate for hot climates. Procurement of pesticides should be linked with procurement of appropriate application and protective equipment. Many host countries need assistance in determining specific requirements. Oregon State U:
Alan Cooper

3. How much of an impact was the 1986 and 1987 control campaign on Mission management?
- The Grasshopper/Locust Program Coordinator was able to work within the Mission system, briefing management on the current situation, and consulting of decisionmaking in regard to the Missions' role in the campaign. Mauritania: W. B. Thomas
 - Burkina: Low - the problems which developed were with unavailability of assistance (the helicopter) but were manageable. If the grasshopper problems had become more severe, the split responsibilities of the OFDA Regional Advisor would have caused management problems within USAID/Burkina.

Niger: High - improvements in the management system and decision making process were needed (see attached Memos). Burkina Faso, Niger: C. Kelly
 - I did see an additional burden placed on Mission management with the extra grasshopper activities plus assisting consultants as they arrived. The ability to hire extra short term people should be a necessity. Niger, The Gambia: C. M. Vcss
 - Probably quite a bit; requiring Mission Directors to re-evaluate and shift priorities on on-going programs. Senegal, Mali, Burkina Faso: R. G. Adams
 - It is obvious that evaluation and control campaign must have been a strain on Mission management. Consideration should be given to augmenting Mission personnel with knowledgeable OFDA people on an as-needed basis for future campaigns. This would mean that OFDA would have to develop a cadre of people with this type expertise for instant mobilization. Chad: P. W. Orr
 - It apparently had a disruptive impact. Even during the Planning Phase, it was evident that the attention of personnel was diverted from their normal activities. Mission personnel were very good about it and went to every effort to be of assistance. They seemed quite capable of handling it in stride during the Planning Phase, but it may well be that during the more extended Control Phase the burden would have been heavier and there might have been some competitive displacement of commitment away from other projects. Senegal: K. Seethaler
 - Mission management was significantly burdened by 86/87 locust campaign, especially between October 86 through June 87; then the program began to operate smoothly. Cameroon: J. Dorman and M. Lang
 - Somewhat of a burden due to understaffing at Ethiopia AID office but for coming year should be less of a problem as additional staff positions have been authorized (to respond primarily to the drought emergency). Chad: V. Diefenthaler

- Heavy and demanding in 1986 but high and smooth in 1987 owing to improvements from experience of 1986 and perfect planning of operations that started early enough (February, 1987), as opposed to the crisis and haphazard preparation of 1986. Chad: J. E. Ohabvike
- Only three out of nine answered the question. All three indicated they thought the campaign placed a considerable burden on Mission Management. USAID used one person nearly full time on the locust program. During the startup of the program, the locust program took up approximately 90 percent of the staffer's time. As the campaign got underway and FAO team was put in place, staff time was devoted to reporting, attending steering committee meetings, chairing subcommittee working group meetings, coordinating donor interventions to DLCO/EA, or the GOS as necessary, and to coordinating secretarial services for the FAO Team. In addition, Mission provided all backstop support to American CICP consultant, including arranging for air freight clearance and expediting of dry ice. Mission locust staffer met frequently during the week with the FAO team. To provide advice and guidance as requested and to follow up on agreed upon actions to be taken. Further, the Mission Director and General Development Officer intervened in all matters of USAID policy of other donors and funding levels. During the design of the medium term phase, Mission projects office resources were heavily tapped and much senior staff time was devoted to donor coordination meetings over the multidonor program. Sudan: GH/L Program
- Limited--administrative burden was placed on a PASA who was manager for an existing project with CPS for food crop protection. Guinea-Bissau: J. A. Franklin
- In 1986, the control program required considerable investment on the part of the Mission staff and resources, i.e., senior management, agricultural officers, financial officers, administrative officers, and contract personnel. Early 1987 planning precluded intense monitoring on the part of the Mission. This requirement was offset by an effective contract team. Mali: USAID/Bamako technicians
- The Mission alone can respond to this question. Mali: S. Sountera

XVII. PUBLIC INFORMATION

1. Were people informed before control efforts took place in their districts?
 - USAID/Cameroon is too far from zone of intervention to be personally aware of public information campaign of the area.
Cameroon: J. Dorman and M. Lang
 - Yes, radio diffusion of methods of control in vernacular.
Cameroon: S. Njymian
 - Yes, the general public was informed of aerial treatment well in advance. Chad: USAID
 - Yes, through radio broadcasts, village heads and CPS surveillance teams. Chad: J. E. Ohabvike
 - Yes. Chad: V. Diefenthaler
 - As much as possible. People were informed through local radio on the intended schedule of spraying. Ethiopia: USAID
 - Six out of nine people responded to the question. Three of these affirmatively. Two said district commissioners were informed by the PPD. One respondent stated they had not stressed the importance of informing people enough. Sudan: GH/L Program
 - Yes. Abidjan: J. A. Franklin
 - Yes, the CPS used a standard information packet for public broadcast. This program was reinforced by infield CPA agents visiting villages in control areas. Mali: USAID/Bamako technicians
 - Public information is limited to information given by staff agents. Mali: S. Sountera
 - Yes, there was an information campaign that informed through use of commercial radio broadcasts upcoming spraying and control efforts. The campaign also emphasized pesticide use safety and proper disposal of spent pesticide containers. oga
 - Yes, through radio announcements. In Niger, experience in the field led to questions of the effectiveness of these announcements. Burkina Faso, Niger: C. Kelly
 - With ground application yes. Aerial application did not involve sufficient warning. Only a general warning that aerial spraying might take place from that date onwards. No detailed warnings. The Gambia: FAO/Banjul: A. Laurence
 - Not always, I believe. Niger: CIDA: F. Boillargeon
 - Yes. Senegal: A. D. Ndiaye

- Public information on TV and radios as well as in the newspaper seems adequate to me. Niger: M. Germaux
- On the whole, yes. Although the aerial spraying in October was less well publicized than previous efforts. The Gambia: A. McKenzie
- Prior to each aerial intervention people were informed by the regional radio system and CPS organization. Senegal: E. Huddleston
- Yes, I believe through several avenues, particularly CPS in Senegal. Senegal, Mali, Burkina Faso: R. G. Adams
- Public radio interviews by the Chief of Party provided information to agricultural areas. Feedback about the radio programs was good. Chad: P. W. Orr
- Informed population prior to control efforts--Not certain. Chad, Niger: J. J. Drea
- National broadcasts were made in the national languages, Arabic and French. Mauritania: Tahar Galledou
- Yes. Chad: Ngaromillet Michel
- Communiques on the national radio either at the end of Ministers Council meetings or separately concerning treatments, rural broadcasting emissions on locust situation and arrangements taken by governmental authorities as well as provincial or departmental information meetings have been, in our opinion, good means to inform the public. Burkina Faso: Gana Diagne
- The rural radio, the national press and Departments of Agriculture and Livestock ensured the public was informed. Ouagadougou, Burkina Faso: Peter Dettmar

2. What were the key elements of the information campaign to inform the public about GH/L control efforts?
- Mission did forward the text used in Senegal to publicize preventive measures for aerial spraying to GRC. Since no aerial spraying was never effected it is not likely that the text was published. Cameroon: J. Dorman and M. Lang
 - Sensitization of the dangers of pesticide intoxication. Cameroon: L. Soumare and A. Giner
 - That farmers should notify the presence of locust larvae, how to use hand dusters, precautionary measures. Cameroon: S. Njymian
 - Two key elements used to inform the public included radio broadcasts and extension agents. Information transmitted to the public about health and safety precautions to be taken prior to the start of the spraying operations, i.e., stay out of the fields, do not leave livestock and other animals in fields, cover all food and water, do not eat dead grasshoppers, in case of intoxication go to nearest health office or contact extension agent. Chad: USAID
 - (A) System of alerting responsible units of infestations; (B) On nature, type, dosage, equipment that can be used by local farmers; (C) On measure of safety that should be observed. Chad: J. E. Ohabvike
 - Extension agents and other officials informed the general public in rural areas. Chad: V. Diefenthaler
 - On safety measures that should be taken such as keeping cattle from sprayed grazing area, etc. Local on-the-ground contact between communities and government or de facto government representatives. Ethiopia: USAID
 - Five out of nine people responded. An official letter from the Ministry of Agriculture to the Regional Governors was sent publicizing the campaigns. Radios, newspapers, television, talks to local farmers and officials were all identified as key elements of the information campaign. Sudan: GH/L Program
 - Personal contact always. Radio/newspaper (very limited). Abidjan: J. A. Frankiin
 - Standard information on protection from exposure to aerial spraying, protection of foodstuffs and water supplies, measures taken in case of pesticide poisoning. Mali: USAID/Bamako technicians
 - The primary element of information dispersal was radio. Every village, no matter its size, has at least one radio, and according to Mauritians and Peace Corps volunteers who have lived in remote areas, the radio is the primary source of information and is listened to frequently. Informative broadcasts were translated into the four spoken languages of this country. Newspapers and television were

also used, but these only reached the capital city population.
Several pesticide safety booklets were prepared and distributed.
Mauritania: W. B. Thomas

- Clarity, specificity and relevancy. Burkina Faso, Niger: C. Kelly
- Farmer training--2-hr sessions--in May 1987. The Gambia: A. Laurence
- The Department of Agriculture staff and Crop Protection agents.
Niger: F. Boillargeon
- Radio and TV broadcasts. Senegal: A. B. Ndiaye
- Radio, CPS visits. The Gambia: A. McKenzie
- Key elements were time, place, personal safety precautions,
precautions for livestock, etc. Senegal: E. Huddleston
- (A) Safety measure to be taken, although the dose rates weren't
harmful.
(B) Areas, to be treated. Senegal, Mali, Burkina Faso: R. G. Adams
- Key elements discussed were the magnitude of the problem, what the
Ministry of Agriculture and Donor Nations were doing and what the
evaluation team was working on. Chad: P. W. Orr
- Extension service activities and pamphlets. Chad, Niger: J. J. Drea
- Talking to the chiefs in villages. psc
- Precautions to be taken before, during, and after treatments.
Mauritania: Tahara Galledou
- Mainly the radio rural. Chad: Ngaromillet Michel
- Radio and especially rural radio with peasants interviews in national
languages (ii) sensibilization trips also made by the Minister of
Agriculture and Livestock have been good instruments for the public
information. Burkina Faso: Gana Diagne
- The media (radio, press) and sensitization field missions by the
competent services. Ouagadougou, Burkina Faso: Peter Dettmar

3. What suggested improvements would you have for a future public information campaign?
- Professional sensitization with basic application guidelines would be helpful in training public awareness in affected areas. Cameroon: J. Dorman and M. Lang
 - Demonstration pamphlets or leaflets. Cameroon: S. Njymian
 - Public radio broadcasts are the best means of informing the rural population. Chad: USAID
 - The use of mobile videotapes at prefectures and villages, as these would give a lasting memory on farmers and operational teams. Chad: J. E. Ohabvike
 - Do the same as this year, but also use public radio broadcasts. Chad: V. Diefenthaler
 - Important to ensure widespread dissemination on all aspects of how to assess, treat and cope with the threat. Creation of more local language leaflets for discussion of community level meetings. Use of posters and leaflets on the nature of locusts, reporting and local control of locusts. Also safe handling and usage of insecticides. Ethiopia: USAID
 - Six out of nine responded. Three thought the public information campaign should be carried out by the Ministry of Agriculture Extension Department. Others suggested posters, talks at village gatherings, information dissemination through traditional leaders such as Nazirs, Omdas, and Sheikhs, as well as Government officials. Mission believes that public information was probably inadequate and agrees with other respondents' suggestions. Sudan: GH/L Program
 - Local use of radio and newspaper was severely limited due to lack of national recording capability, infrequent publication and a general lack of government of Guinea-Bissau resources. Emphasis will be placed on posters next year to get specific messages out combined with continued personal contacts which are considered most effective. Abidjan: J. A. Franklin
 - Assist the CPS in the development of awareness literature in comic book form. Publicize pesticide usage instructions in local languages. Mali: USAID/Bamako technicians
 - Public information can be improved with the help of the rural radio. Mali: S. Sountera
 - This can be better answered after an evaluation of this year's campaign that will take place in the spring of 1988. Mauritania: W. B. Thomas
 - Public information programs in Niger and Burkina appear to be good. Niger's use of television is well developed. There still is a lot of

- ground to cover in educating farmers about the nature of pest problems and control procedures. This is a long term activity. It should continue to be pursued in a systematic and innovative manner through the use of television, rural radio and frequent public meetings and training sessions. Burkina Faso, Niger: C. Kelly
- Daily-weekly radio programs concerned pest situation, pest control, risks of treatments, environmental considerations, IPM concept. The Gambia: A. Laurence
 - It (Public Information) should be initiated in advance. Niger: F. Boillargeon
 - More information on benefits of pest management vs. pest obliteration, environmental considerations, safety and health. The Gambia: A. McKenzie
 - The program appears to work well in Senegal. Senegal: E. Huddleston
 - I do not have facts on how information to the people was handled but would suggest distribution of posters or leaflets with sufficient detail and diagrams to explain what is being done and how to cope with it. Niger, The Gambia: C. M. Voss
 - Incorporate success stories from 86 and 87. Senegal, Mali, Burkina Faso: R. G. Adams
 - Printed handouts and pictorial posters for each Prefect would get the message out. Chad: P. W. Orr
 - It would have to be verbal. Get information to people in villages. Mali: S. Tunnock
 - I'm not qualified to answer these questions. I do have one comment. A weekly radio program (in native languages) to inform farmers about crop protection activities is an excellent and inexpensive way to increase the public awareness of crop protection. Maybe crop protection services could be encouraged to initiate this type of activity. It would provide a vehicle for future public information messages concerning the hazards of aerial spraying (rather than doing it on an ad hoc basis). Senegal, Mauritania, The Gambia: B. Overholt
 - Unfortunately, the awareness campaign, which received USAID financing, was not evaluated. Evaluations make improvements possible by rectifying deficiencies in methods used. Mauritania: Tahara Galledou
 - To increase and intensify radio broadcasting. Chad: Ngaromillet Michel
 - A reinforcement of rural radios which very often are deprived of equipment; a larger sensitization by informal causeries on the radio on the goals and the means of locust control, causeries which

should be done in national languages with peasants' participation.
Burkina Faso: Gana Diagne

--- Reinforce the radio system as a first source of information of the
rural world. Ouagadougou, Burkina Faso: Peter Dettmar

GRASSHOPPER/LOCUST CONTROL CAMPAIGNS OF 1986 AND 1987

LESSONS LEARNED

GRASSHOPPER/LOCUST CONTROL CAMPAIGNS OF 1986 AND 1987

LESSONS LEARNED

CONTINUING QUESTIONS AND OTHER ISSUES

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INTRODUCTION

Lessons Learned is a part of the USAID evaluation process. It is an attempt to learn from experience and to capture the observations of individuals involved with USAID development programs. These in turn are useful when reflecting upon the implications for USAID policies and programming and for replicating activities in other contexts (White, 1986; 50). Lessons Learned is also useful in evaluating what went right and why, what when wrong and how, and what can be done to improve programs and program implementation. The two essential points of this are (1) the strive toward excellence that one hears so much about does not imply things are bad, but only that they can be improved, and (2) error detection and correction are crucial to improving policy and program implementation.

The lessons contained in this summary were garnered from a variety of sources. Many came from the Grasshopper/Locust Control Campaign Evaluation Questionnaire sent to campaign participants in fall, 1987. Other lessons were contained in trip reports from campaign participants and from periodic reports and evaluations submitted by USAID personnel and missions. In a number of cases contributors discussed the same or similar issues. I combined these into a single lesson attributable to more than one individual. This increased the chances that contributors' discussions were taken out of context and that in combining two discussions one of them was misinterpreted. There is also a possibility that some of the discussions and issues were misattributed during my efforts at compiling this summary. Those mistakes would be mine and not the contributors'.

Lessons from Charles Kelly, an AID personal service contractor, were especially clear, well thought-out, and informative.

JAKE GREENE

Sierra National Forest

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Detailed to the Office of Foreign Disaster Assistance, USAID

- 6.2 Radios are practical and effective for relaying information gathered during field surveys; acquisition of more radios could increase the effectiveness of communications. In Chad, the survey plan communication system relied upon existing radios belonging to PVO's, the Extension Service, and the Crop Protection Office. This proved barely adequate for the timely transmission of field survey findings. Teams were to have transmitted three messages per week when, in fact, messages were sent once per week. In many cases, survey areas were remote and far from radio posts. A few vehicles were equipped with radios financed in 1986 by USAID through FAO. These vehicles proved to be very practical and useful, in the sense that situation reports were transmitted in a timely fashion. The Crop Protection Service would still benefit from the acquisition of additional portable radios.

Recommendation: (6.2.a) USAID and/or donor nations should supply radios to the CPS for use by survey teams.

Source: US Embassy

Location: Chad

Keywords: Chad, Communications, Radios, Reporting, Surveying

- 6.3 Helicopters are valuable for visiting remote sites and their use can increase the efficacy of survey, control, and evaluation work. Prospection teams cannot always reach sites of reported infestations because of the site's remote location or because of weather and/or road conditions. These situations retard prospection, evaluation of the degree of infestation, and the preparation of maps for use in pesticide spraying. This in turn impedes actual operations. Furthermore, because little pre-treatment pest assessment has been carried out, it is difficult to evaluate the degree of success with certainty.

Recommendation: (6.3.a) use helicopters to visit remote sites.

Source: USAID/N'Djamena

Location: Chad

Keywords: Aerial Surveying, Assessment, Aviation, Chad, Evaluation, Surveying

7. PROCUREMENT.

- 7.1 Innumerable delays in purchasing were encountered because missions followed standard procurement procedures. These delays resulted in an increase in the cost of acquiring pesticides and presented a potential compromise to a portion of this assistance program. The procedures used are designed to facilitate regular development procurement activities and can obstruct, and be counter-productive in, emergency response situations.

Recommendation: (7.1.a) develop special procurement procedures for emergency-related purchases. Two options which would permit missions to respond quickly and effectively to immediate emergency-related needs are (a) use of waivers and (b) delegations of authority.

Source: C. Kelly, PSC, USAID
G. Schaefers, Consultant

Location: Burkina Faso
Sudan and Mali

- 7.2 Purchasing agents must scrutinize orders for materiel and equipment closely in order to avoid purchasing inappropriate items. It appears that host-governments used the emergency grasshopper/locust control campaign as an opportunity to enlarge their supply inventories. This is an understandable strategy, but wasteful of limited emergency funds which could be used elsewhere. Other examples of waste are the purchase of equipment which was inappropriate to the effort (wheelbarrow spray rigs), the acquisition of more equipment than could be used by the qualified users (equipment exceeded use capacity), and computers. This last item, computers, is of lower priority than equipment replacement parts, communication equipment, personal protective clothing, and secure pesticide storage facilities.

Recommendation: (7.2.a) purchase only those supplies and equipment which can help meet the objectives of the emergency pest control project.

Source: K. Seethaler, Consultant Location: Senegal
 T. McNary, Entomologist The Gambia
Keywords: Gambia, Host Country, Procurement, Senegal

8. LOGISTICS AND HANDLING OF SUPPLIES

- 8.1 In Chad, prepositioning pesticides and aircraft fuel was the factor that most contributed to the success of the control operation. Having these supplies at operating sites reduced delays in control project implementation and allowed the flexibility needed to reschedule the treatment plan.

Recommendation: (8.1.a) preposition supplies before the start of the operation, before the growing season, and before roads become impassable during the rains.

Source: USAID/N'Djamena Location: Chad
Keywords: Chad, Logistics, Pesticides, Preparedness

recommendation: (9.1.d) once USAID has obtained experienced contract administrators, frequent on-site visits should be made to insure operations are taking place as planned and that desired outcomes are being produced. Errors in and obstacles to implementation can then be detected and corrected.

Source: C. Kelly, PSC, USAID Location: Niger and Burkina Faso
Keywords: Aviation, Burkina Faso, Contracts, Contractors, Niger, Training

- 9.2 Contractor performance did not always meet with contractual requirements. Some contract-related problems centered about the quality of equipment provided. At other times, contractor performance problems had to do with a lack of operational experience on the part of the contractors' employees and with the contractors' lack of knowledge of operational conditions in the Sahel.

Recommendations: (9.2.a) contractors should be required to replace immediately any unusable equipment or unqualified employees; (9.2.b) weed out inexperienced contractors by the use of pre-qualification requirements (inquire into hiring and training practices, specify equipment to be used, inquire into breadth of contracting principals' experience) prior to accepting bids; (9.2.c) in the prospectus and contract clearly advise interested parties that they will be involved in emergency activities in a harsh environment where replacement parts are difficult to procure; and (9.2.d) a system of sanctions and incentives to ensure expeditious contractor performance needs to be developed and integrated into future contracts.

Source: C. Kelly, PSC, USAID Location: Niger
Keywords: Contracts, Contractors, Niger

- 9.3 The aerial spraying contractors began operations in Chad with fewer ground support personnel than prescribed in the contract. Although no delays in operations resulted from this lack of ground support, all team members were overworked and exhausted. For example, a single individual was responsible for all the aircraft maintenance, logistical coordination, administrative paperwork, radio operation, and served as the second vehicle driver. Fatigue adversely affects concentration, which ripens into unsafe behavior and unsafe situations. Furthermore, the USAID/N'Djamena technical staff essentially was forced to provide all managerial direction for the contractor.

Recommendations: (9.3.a) USAID must assure that an adequate number of support people is required under contract provisions; and (9.3.b) Missions must ensure that the specified number of support people are supplied by the contractor.

Source: USAID/N'Djamena Location: Chad
Keywords: Aviation, Chad, Contracts, Contractors

10. TECHNICAL ASSISTANCE

- 10.1 Delays and problems were encountered in the identification of experts with appropriate technical and language skills. For example, USAID/Burkina Faso, at the behest of the GOB, requested the services of an entomologist for the period of mid-June to the end of October, 1987. Because of stateside delays in identifying an appropriate individual, the expert did not arrive in country until early August.

Recommendation: (10.1.a) assemble stateside rosters of qualified or substantially qualified individuals to provide technical support for USAID's international activities. Substantially qualified means individuals who could become qualified with additional training or with on-site support such as translators.

Source: C. Kelly, PSC, USAID Location: Burkina Faso
Keywords: Burkina Faso, Disaster Personnel, Technical Advisors, Technical Assistance

- 10.2 The technical assistance USAID Missions received from other USG agencies was valuable, and it would be worthwhile to increase the number of such sources. Employees from the USDA, Forest Service and APHIS provided the majority of the technical assistance needed to make the grasshopper/locust control campaign a success. Other agencies such as the USDI, Bureau of Land Management (BLM) and the National Park Service (NPS) have also long been involved in managing emergency situations and have similarly trained employees. Increasing the number of agencies from which to draw from effectively increases the size of the pool of trained and qualified individuals available to provide technical assistance.

Recommendation: (10.2.a) AID/W should establish contact with the BLM and NPS and reach agreement with these agencies for the provision of qualified technical assistants for overseas assignments.

Source: R. Adams, Jr., USDA, FS Location:
Keywords: Disaster Personnel, Technical Advisors, Technical Assistance

10.3 Technical assistance from all sources is valuable and appreciated, and can be improved by defining the roles that individuals are to play. Members of the academic community are assets in planning and research and their advice during emergency activities is helpful. Academics tend to be less familiar than technical assistants with operational tasks such as those associated with aerial spray application of pesticides.

Recommendation: (10.3.a) the roles of researchers and operations advisors and how they are to be integrated into control activities need to be clearly articulated.

Source: R. Adams, Jr., USDA, FS Location:
Keywords: Disaster Personnel, Technical Advisors, Technical Assistance

10.4 USAID assistance needs and the help that technical advisors were able to provide did not always match. Nor did prospective technical advisors' perceptions of what the situations in which they were to be involved always match reality. Technical assistants used on the grasshopper control campaign should have second language capabilities, as well as a broad background air- and ground-based spray operations, aircraft and ground equipment calibration, swath width determination, and target pest biology. The aerial treatment specialist resigned for personal reasons at the start of spraying operations; this caused an unforeseen change in project staff.

Recommendation: (10.4.a) technical assistants should be interviewed by USAID prior to the technician's dispatch overseas. This interview would allow USAID to evaluate the individual's capabilities, experience, and character. The interview would also inform the candidate of the difficulties of the job and avoid surprises when he or she arrives in country.

Source: R. Adams, JR., USDA, FS Location:
 American Embassy Chad
 G. Cavin, Consultant
Keywords: Chad, Disaster Personnel, Technical Advisors, Technical Assistance

11. PEST CONTROL OPERATIONS

11.1 Poisoned baits are preferable to dusts where practicable and when suitable bait materials are available. Suitable bait materials include flacky rice, millet, or wheat bran, and rice or millet hulls. Baits have numerous advantages. They are easily applied by hand and require little safety equipment when pesticides such as carbaryl, fenitrothion, and propoxur are used. Baits, being voluntarily taken by grasshoppers, are less expensive to use than are dusts because baits do not require complete coverage for adequate control. Finally, baits stand up better under adverse weather conditions than do dusts.

Recommendation: (11.1.a) use baits whenever it is practical to do so.

Source: G. Cavin, Consultant
Keywords: Pesticides, Safety

Location:

- 11.2 The variables that affect aerial application of ULV pesticides are never so well controlled under field conditions that uniform coverage is achieved. Pilot consistency, accurate swath marking, and field marking with smoke can yield significant improvements in applications.

Recommendations: (11.2.a) give pilots adequate observed flight time to ensure that they control application speed and height; (11.2.b) give pilots indications of wind speed and presence of inversion layers by marking application areas upwind with burning rags or sections of tires; (11.2.c) equip planes with swath marking devices or dyes to avoid double applications or areas missed; and (11.2.d) provide for air-to-ground radio communications so that on-spray-site ground support can advise pilots of how operations are proceeding.

Source: S. Straley, USDA,FS
Keywords: Aviation, Niger, Pesticides, Spraying Equipment

Location: Niger

- 11.3 Large aircraft are a valuable piece of equipment in efforts to control grasshoppers and locusts in Africa. They should not be excluded from the arsenal of tools available to those involved in pest control campaigns. Reasonable parameters for the use of large aircraft for these operations have been established by FAO. Judicious use of large aircraft is called for when control operations over large areas are being considered. This is because large areas encompass a variety of ecological types, with each type providing different habitats for pests and other living things.

Recommendation: (11.3.a) continue to use large aircraft and continue to exercise care in their use.

Source: G. Cavin, Consultant
Keywords: Aviation, Environmental Impact

Location:

- 11.4 The use of large aircraft for spraying pesticides requires considerations of land use, ecological type, and alternative uses of aircraft time. It is wisest to use aircraft to treat crops and create a buffer strip around fields when a pest becomes a problem. There is no need to treat forests for control of local grasshopper species and aerial spraying is inefficient grasshopper control in forests in any case. Upland rice and other crops in forested areas would be treated most effectively from the ground. Though the tendency has been to keep large aircraft on standby in anticipation of large infestations, these craft should be used to treat fields currently instead.

Recommendation: (11.4.a) base decisions on the use of aircraft for pesticide spraying on factors such as land use, ecological type, and the tradeoff between preparedness for anticipated infestations and use on current infestations.

Sourcé: T. McNary

Location: The Gambia

Keywords: Aviation, Environmental Impacts, Pesticides

**CONTINUING QUESTIONS
AND
OTHER ISSUES**

POST SEASON USE OF CPS AIRCRAFT

There are advantages to using CPS aircraft for other tasks once seasonal grasshopper/locust control operations are completed. Based on estimated operating costs for 1987, the flight rate for the Cessna 188 AG truck flying 250 hours was approximately \$ 550 per hour. An additional 100 hours of flight time reduced these field costs by one-fourth. Even more hours flown during the maintenance contract period would tend to further improve these rates. More time spent flying would keep pilot skills at a high level. In addition, longer periods of employment would tend to keep pilots from moving to permanent employment elsewhere. A number of issues attend this policy question:

- * Additional flight time will incur additional expenses.
- * Maintenance and support costs sustained by donors are contracted for only the projected infestation period.
- * Can donated chemicals be used to aid private enterprises?
- * Is there a larger demand in the public and private sectors for aviation services in developing nations?

S. Straley, USDA, FS; Niger

SUPPORT GIVEN TO NATIONAL PLANT PROTECTION SERVICES

For a long time it was thought that to give aid was to give the power to act. Some still believe this. It is true that aid in the form of equipment and chemicals is essential, provided such aid is properly tailored to requirements. But the people involved must be capable of using this potential with good sense and discrimination. This is why education and training, in a broad sense, from initial instruction to periodic updating, should be a priority. Independence in decision making and resource management will only come when the people concerned are knowledgeable and well-informed.

Additional measures too are necessary, such as upgrading the professional status of field survey workers and observers.

M. Launois, PRIFAS/CIRAD

BUILDING ON-GOING NATIONAL PLANT PROTECTION SERVICES

One issue to consider is that of recurrent costs. This problem cannot be resolved completely, but it can be controlled by limiting the number of positions within plant protection services to the absolute minimum needed. Operational costs can be kept low by setting up a system of user's fees to recuperate the costs of purchasing pesticides and fungicides.

Another issue is the use of expatriate experience. During the 1986 campaign, outside advice overwhelmed any input from the National CPS. If the CPS is to exist after donor funds dry up, it is important that valid expert-counterpart relationships be established. One way to cause this to happen is to plan sunset dates for expatriate advisors and to give those advisors a clear understanding that their jobs are to impart the needed plant protection knowledges and skills to members of the national CPS's.

C. Castleton, AID/W
P. Orr, USDA, FS

DONOR COORDINATION

Several organizations are currently competing for the responsibility of coordinating pest management activities in the Sahel region. Although CILSS has a clear mandate, it has a poor track record. OCLALAV is practically defunct. FAO continues to be the only valid multinational organization capable of coordinating such an effort, and should receive USG support. FAO is also a good choice because it is capable of assisting the CPS's in obtaining additional funding in related areas such as pesticide legislation and plant quarantine legislation.

C. Castleton, AID/W
P. Orr, USDA, FS

INFORMATION RESOURCE

There is a need for a more generalized information system. Much information is being assembled at present, but very little is used in an organized fashion for decision making on a local, national, or international basis.

- * Can an effective "expert system" be developed to help pest management decision makers construct pre-plans, implement and monitor plans being executed, and evaluate the success of the operation afterward?

- * Does enough information exist?
- * Would a model help identify information needs?
- * To what level of decision making should the model be oriented?
- * Can the system include existing biological and economic models?

S. Miller, PSC

PEST CONTROL "SWAT" TEAMS

There may be some merit in creating pest control "SWAT" teams and having them under contract, poised, and ready in various countries. Donor countries could help by forming national teams. These teams would consist of several small to medium sized spray planes accompanied by one or more helicopters. Pilots, engineers, and other team members would be selected on the basis of their backgrounds and experience in working under conditions similar to those found in Africa. Teams would be assembled in advance in workshop arrangements to review responsibilities, to check assembled equipment, to calibrate spray equipment, and to perform other preparatory tasks. Actual dispatch to infestations would occur on a staged basis, with helicopters to be used for pest surveying being the first to go. The advantages of this sort of organization are:

- * the organization would be in place prior to the emergency, and could be activated quickly.
- * donor countries could select experienced operators ahead of time, thus freeing donors from their dependence upon low bidders of unknown ability.
- * team members selected for their technical expertise could select appropriate equipment and supplies ahead of time during their workshop(s).
- * once created, an organization of this sort could be reactivated in succeeding years if needed.

The following issues will need resolution in order to implement this concept:

- * Would the private sector make the aircraft and people available on either a part-time or standby basis?
- * Can and should equipment be standardized from one donor team to another, so that teams from different donor nations could join together in strike team or task force operation?

- * Can donor nations grant preference for previous African experience and/or previous acceptable performance when contracting for this service?

C. Voss, CEO AgRotors, Inc.

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- Cameroon: 10567: 86-87 GH/L Control Program Questionnaire: S. Njymian.
- Chad, Niger: USDA, ARS: GH/L: J. J. Drea.
- Chad: USDA, FS: GH/L: P. W. Orr.

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five responses).
Mauritania: USAID/Novakchott: GH/L Questionnaire: W. B. Thomas.
Niger, The Gambia: PSC: GH/L: C. M. Voss.
Senegal, Mali, Burkina Faso: USDA, FS: GH/L: R. G. Adams, Jr.
Senegal: PSC: GH/L: G. E. Cavin.
Senegal: PSC: GH/L: K. Seethaler.
Sudan, Mali: PSC: GH/L: G. A. Schaeffers.